

FLORIDA STATE UNIVERSITY

MOSQUITO CONTROL AT THE DISTRICT LEVEL:

Alternative Solutions for Public Health Officials for the Control of Mosquito-borne  
Diseases

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## EXECUTIVE SUMMARY

Florida has a long history of attempting to contain mosquitoes in the interest of public health and nuisance control. There are currently 54 mosquito control districts in Florida that are charged with these responsibilities. These districts are given broad independent discretion in the management of mosquito populations within their jurisdiction. Many of the districts extensively utilize the common practice of chemical treatment to control mosquitoes. This is apparent from the pesticide usage reports required by Department of Agriculture and Consumer Services. In the 1999-2000 reporting year, over 700,000 pounds of adulticide and 190,000 pounds of larvicide were applied to the soils and waters of Florida to control mosquitoes (FDACS, 2001). Unfortunately, with this quantity of pesticide usage in Florida, there are extensive off-target extermination of beneficial insects, pollution of soils and water and adverse exposure to the general population. The purpose of this report is to examine the efficiency of current chemical treatment policies, integrated mosquito management and non-pesticide based mosquito management policies for mosquito abatement methods.

The issues surrounding public-sector mosquito control have a long history dating back to the beginning of the twentieth century. The traditional chemical approach to began in the middle of the twentieth century. By the early 1950s it was apparent that chemical control as a sole source for management was doomed to failure. The techniques of source reduction were instituted. Next larvicides were introduced to control the immature mosquitoes while still in the aquatic environment. All of these techniques have proven to present problems ranging from development of pesticide resistance to adverse effects on non-target species, including humans.

Applicable literature topics that address the effects of mosquito control policies on the health and welfare of the citizens and environment they serves include: Current recommended mosquito control program techniques; Insecticide resistance and risk of chemical control measures; Cost of operating a program; and Threats of emerging mosquito borne diseases.

Information was gathered by using all available resources: news media, academic resources, federal, state, local and industry association publications which were reviewed to provide background information and insight into problems facing mosquito control methods. District Directors provided insight into the challenges facing current programs and innovative solutions and techniques to those challenges.

This report presents three policy options for the control of mosquitoes for public health officials: 1) Maintain Current Policies and Programs; 2) Integrated Mosquito Management; and 3) Non-Pesticide Based Mosquito Management. Each option is evaluated against four criteria: 1) effectiveness; 2) cost; 3) environmental detriment, and 4) administrative feasibility.

Based on the assessment of the alternatives using the evaluation criteria it is recommended that Mosquito Control Districts move to a Non-Pesticide Based Mosquito Management policy. The transition away from techniques that have been in use for over a half of a century will require a concerted effort by policy makers; however the long term benefits will be apparent through better mosquito control and less environmental impact. This transition to Non-Pesticide Based Mosquito Management will provide long-term mosquito population control for communities while providing sound fiscal, administrative, health and environmental benefits.

## **I. PROBLEM STATEMENT**

There are over 1,200 miles of coastline in Florida and Florida is inhabited by 73 species of mosquitoes and populated by over 15 million people. The increase in human population has pushed people into the habitat of the mosquitoes. Land that was once considered inhospitable is now considered prime development real estate for the ever-increasing demand for country living estates for the growing population of new Florida residents. As a result of this, human and domestic animal populations are increasingly exposed to the habitat of the mosquito. Mosquitoes are known vectors of diseases such as protozoan diseases (e.g., malaria), filarial diseases (e.g., dog heartworm), and viruses (e.g., dengue, encephalitis, West Nile virus, and yellow fever). As a result, Florida has a long history of attempting to control mosquito populations. Public health officials are charged with the control of these vector insects and perform this control by various techniques. This paper will briefly examine the effectiveness and efficiency of these techniques as well as emphasize alternative policy approaches to the control of mosquito populations.

Florida has 54 Mosquito Control Districts. These districts have a large repository of chemical agents to control mosquito populations. These districts use a combination of adulticides (pesticides used to treat the adult stage) and larvicides (pesticides used to treat the larval stage) to control mosquito populations. The districts derive their authority through Chapter 388 of the Florida Statutes. The individual districts are given broad discretion in the management of mosquito populations in the interest of public health. In 1999-2000, Leon County alone used a combination of 9,592 gallons and 33,756 pounds of adulticide and 1,041 gallons and 9,445 briquettes of larvicide to control mosquito population within the county.

The Florida Mosquito Control Association (FMCA) recognizes that, in theory, a long-range, intelligent, and environmentally sound pest control and management program should be used to control pests. This should employ methods that are thoughtful and ecologically sound with long-term, positive effects. The current measures that are in use in many of Florida's 54 districts have yet to effectively implement this philosophy of pest management. These measures still resort to the standard tactics that have been commonly used for mosquito abatement for the last 40 years. This is evident by a review of the required reporting of usage by the districts to the Department of Agriculture and Consumer Services. In the 1999-2000 reporting year, over 700,000 pounds of adulticide and 190,000 pounds of larvicide were applied to the soils and water of Florida in the attempt to control mosquito populations. These techniques have demonstrated that they do not provide long-lasting results (EPA, 2002; CDC 2001).

Annually there are reports of vector disease outbreaks in Leon County as well as Florida in general. Every year local mosquito control authorities employ traditional techniques to control mosquito population. Local authorities have limited funding and limited technical resources to address these issues. It is difficult for public administrators to implement new policies without financial support. The latest-method advances in vector control are often left in the halls of the academic world and never reach the implementation stages at the state or county level. The purposes of this report are: first, to provide a brief review of the procedures of a single Mosquito Control District, Leon County Mosquito Control; second, to examine programs in other districts which emphasize alternative policy approaches; third, to develop criteria to determine policy options best suited for the control of mosquitoes at the district level; and fourth to examine alternative policies and make recommendations as to the best option for local mosquito control districts.

## II. BACKGROUND & LITERATURE REVIEW

### **Background**

Some of the significant issues surrounding public policy to control mosquitoes are presented to provide a greater understanding of the issues facing mosquito control decisions of today. To be discussed are: historical perspectives of how mosquito control became a public sector issue, a discussion on the traditional chemical and physical approaches to mosquito abatement, and the health effects of vector-carrying mosquitoes.

Florida has waged a long battle with the mosquito. When the Spanish arrived in Florida, they noted the mosquito population was unbearable. Since the time of the earliest maps, some of Florida's inlets, lagoons, and sections have borne the name Mosquito. In the eighteenth century, the part of Florida between the St. Johns River and the coastal lagoons north of Cape Canaveral was called "The Mosquito Country" or "The Mosquitoes (BCMC, 2000)."

The U.S. Army, U. S. Public Health Service and the State Board of Health began a program of drainage and application of larvicides at Camp Johnson, near Jacksonville during World War I. In 1919, the State Board of Health, the city of Perry and the Burton Swartz Cypress Company jointly established a malaria-control project, since Perry was a region with a high occurrence of malaria. The Perry project was one of the largest malaria control programs in the country and was the first non-military control venture in Florida (BCMD, 2000).

The history of the institutionalization of mosquito control began in 1922 with the formation of the Florida Anti-Mosquito Association, now known as the Florida Mosquito Control Association. This was followed shortly by legislation creating mosquito control Special Training Districts, now known as Mosquito Control Districts. The first district formed was

Indian River in 1925. The St. Lucie and Martin Mosquito Control Districts were formed shortly thereafter; and, by 1935, five districts had been created (BCMC, 2000).

The traditional chemical approach to mosquito control began at the end of World War II with the use of DDT (dichlorodiphenyltrichloroethane). The initial results with DDT were extremely good; however, within a few years the mosquitoes developed resistance to DDT and other chlorinated pesticides (BCMC, 2000). In addition, the ecological environment and many non-target species suffered greatly from the use of the long-lived chlorinated pesticides that persisted in the soil and water and bio-accumulated in the food chain. Although banned in 1972, the legacy of DDT persists to this day (EPA 1975, 2002)

The classic example of what not to do in the management of a mosquito problem occurred in the 1950s. To treat a malaria outbreak in Borneo, the World Health Organization (WHO) sprayed DDT to kill the mosquitoes. The DDT also killed a parasitic wasp that controlled thatch-eating caterpillars. As a result, the roofs of the homes that were made of thatch fell down. Additionally the DDT poisoned insects that were, in turn, eaten by geckoes, which were then eaten by cats. The cats were poisoned and died which led to the multiplication of rats. Next, there was an outbreak of sylvatic plague and typhus that were carried by the uncontrolled rat population. In order to stop this destructive chain of events, WHO parachuted 145,000 live cats into the area to control the rats (Tvedten, 2000).

By the early 1950s, public administrators and scientists realized that the sole use of chemicals to control mosquito populations was doomed to failure. A new concept of permanent control through source reduction was implemented throughout Florida. Funding was approved through legislation for the elimination of thousands of acres of salt marsh breeding sites (FCCMC, 1998). These source reductions were effective in reducing breeding sites, eliminating

the need for larvicide, and reducing the need for adulticide applications; however, the environmental impacts were: high mortality of native marsh vegetation and the isolation of these salt marsh habitats for marine species to use for juvenile development. The result was the negative impact on commercial and recreational fisheries, costing the industry an estimated multi-billion dollars (FCCMC, 1998).

Mosquito Control Districts turned to the organophosphates which prove to be more toxic yet less persistent in the environment to treat for adult mosquitoes. The wide spread use of these organophosphates in both mosquito control and agriculture has lead to the development of mosquito resistance to many of the chemicals used for mosquito control. The continual practice of spraying to satisfy the public demand for nuisance mosquito control has helped lead to mosquito resistance to numerous chemicals (FCCMC, 1998). Additionally and most importantly these chemicals are know as broad-spectrum insecticides that indiscriminately kill target as well as non-target insect species.

The use of larvicides introduced to control mosquitoes while still in the aquatic environment has had the unintentional effect of reducing the food sources of many marine organisms. Many marine organisms' diets consist of many larval arthropods that are also susceptible to the same larvicides as mosquitoes. Many marine, estuarine and freshwater species share the same habitat as mosquito larvae. It is readily acknowledged that the lack of understanding of the complex food web and effects on non-target species provide even greater complexity to the policies to control mosquito populations (FCCMC, 1998).

Legislation has been developed which has two objectives: 1) to achieve and maintain a level of arthropod (specifically mosquitoes) control that will protect human health and safety and foster the quality of life of the people; 2) to promote economic development of the state and

facilitate the enjoyment of its natural attractions by reducing the number of nuisance and disease carrying arthropods. In addition, this policy is to conduct arthropod control in a manner consistent with the protection of the environment and ecological integrity of all lands and waters throughout the State (F.S. 388.0101).

Mosquito Control District policies have needed to shift emphasis from the control of nuisance pests to the control of the spread of disease vectors. The presence of St. Louis Encephalitis and Eastern Equine Encephalitis is well documented and the use of sentinel chickens is standard police for monitoring of these diseases. A new threat has been introduced with the introduction of West Nile Virus in 1999. In 2000, 12 states identified some West Nile Virus activity. By the end of 2000, 21 humans, 63 horses, 4,304 birds and 14 mosquito species were reported with West Nile Virus (CDC, 2001). In 2002, dogs in Louisiana have been documented carrying the disease (McConnaughey, 2002).

This background provided information on the historic attempts that underscore the complexity of a seemingly simple task of controlling mosquito population. The historical battle and chemical legacy are issues that need to be considered when future attempts are made to control vector-carrying mosquitoes.

### **Literature Review**

Mosquito control policies affect the health and welfare of the citizens and environment that it is designed to serve. The applicable literature on this topic addresses these themes:

1. Current recommended mosquito control abatement program techniques;
2. Insecticide resistance and the risk of chemical control measures;
3. Cost of operating a program; and

4. Threat of emerging mosquito-borne diseases.

First, the literature reviews on this subject concur that an integrated pest management program should use a combination of resource management techniques. The underlying philosophy of mosquito control programs is based on the fact that the greatest impact occurs when the mosquito population is concentrated, immobile and accessible (EPA, 2000). The most recommended approach is to use an integrated pest management strategy. The EPA (2002), FCCMC (1998), Rose (2001) and the FMCA (2000) all agree that it is in the best interest of public health to use a several-pronged approach to control mosquitoes.

FMCA (2000) stresses the importance of training and education initiatives. The purpose of the various educational initiatives is to provide for an increased professionalism among mosquito control workers and a better-informed public, thus making significant progress in reducing pesticide use and risk. Appendix 1 contains the complete Florida Mosquito Control Association's discussion on mosquito control integrated pest management strategies.

The CDC (2001) adds that an integrated pest-management program should also contain surveillance covering larval, adult and virus populations pre- and post-abatement technique application. In addition, the literature published by the CDC recommends that chemical control should be used *only* when other methods have not proven feasible or failed because of unavoidable problems. The use of chemical control measures should be used as a last choice, not as the first control method.

There are many literature resources on the insects' ability to develop resistance to insecticides used to control them, which is the second topic to be addressed in the literature review. The first report of insect resistance to synthetic insecticides occurred over 50 years ago. In 1979, the United Nations Environmental Program declared pesticide resistance to be one of

the world's most serious environmental problems. Neppels (2000) discusses the significance of insecticide resistance: the potential spread of disease by resistant insect; the addition to the environment of new and toxic insecticides to fight insects; and the increased application of chemicals to treat resistant populations of pest.

Many of the authors stress the importance of altering the pesticides used in mosquito population control (DACS, 2001; EPA, 2000; FCCMC, 1998; Rose, 2001). The American Mosquito Control Association weighs in on the issue of resistance by stating, "Insects have the innate ability to stay one step ahead of us by developing resistance to the relatively few products available."

The CDC takes the issue of insect resistance a step farther by recommending a resistance management component be added to an integrated pest management strategy. Such a component should include annual monitoring of the status of resistance in the vector population. This will:

1. Provide baseline data for pesticide selection prior to control operations;
2. Detect the presence of resistance at an early stage so that timely management can be implemented to prevent further resistance from developing; and
3. Continuously monitor the effects of control strategies on resistance (CDC, 2001).

The literature does discuss the evidence of risk to human health related to pesticide exposure (CDC, 2001); EPA, 2002; FMCA, 2000). Although mosquito control techniques are not the sole source of public exposure, they do contribute to the problem and as such should implement prudent strategies to limit the exposure of the public to such toxins (EPA, 2002; FMAC 2000). The FCCMC (1998) recommended the mosquito control districts apply pesticide only after adequate surveillance verifies the need for applications.

Third, the literature used to determine the cost of operating a mosquito control program came from budget documents supplied through Leon County's annual budget for five years and cost analysis from FMCA (2000). These documents provided a good overview of the fiscal

dimension of public mosquito control. The complete 2001-2002 year budget for Leon County Mosquito Control is located in Appendix 2.

Fourth, the literature discusses the occurrence of mosquito-borne diseases in the United States (CDC, 2001; FMCA, 2000; Rose, 2001). There is general agreement that the incidences of these diseases are typically low. Rose (2001) does mention that occasional epidemics do occur as they did in 1978 with 1,967 and 1990 with 247 cases (mostly in Florida) of St. Louis Encephalitis.

The CDC recommends that, because of bird migration patterns, enhanced surveillance should be a high priority for those states that are affected or at high risk of being affected by West Nile Virus. The surveillance program should include:

1. Active bird surveillance;
2. Active mosquito surveillance;
3. Enhanced passive veterinary surveillance; and
4. Enhanced passive human surveillance (CDC, 2001).

The CDC maintains statistics tracking the spread of West Nile Virus across the country. As of September 20, 2002 there have been 1,852 confirmed human cases resulting in 89 deaths for this year. In addition, there are only six states in the continental United States that have not reported NVE infection in birds (CDC, 2002).

In summary, the literature covers many of the issues facing public mosquito control districts. In reviewing the literature, the need for a proactive approach to this problem from national, state and local policy makers is highlighted, being initiated by the recent introduction of the West Nile Virus which is rapidly making its way across the country. This report augments the existing literature by providing alternative recommendations that will assist policy makers in making correct decisions when choosing the course of action with their local mosquito control

programs. These programs have a broad ranging impact on the health and welfare of the public and environment.

### III. METHODOLOGY & EVALUATION CRITERIA

#### Methodology

Information for this report was collected using the following methods:

- Analysis of relevant academic literature and popular media using 1) Internet search MSN search engine 2) science direct at <http://www.sciencedirect.com/>, 1980 to present 3) CSA Internet Database Service at [http://www.csa.com/htbin/ids52/procskel.cgi?fn=f\\_category.html&ctx=/wais/idstmp/ctxAAAwRa4Nt;](http://www.csa.com/htbin/ids52/procskel.cgi?fn=f_category.html&ctx=/wais/idstmp/ctxAAAwRa4Nt;) 1980 to present.
- Review of Federal, State and Local agency and industry association publications;
- Analysis of applicable laws, rules, regulations, policies, and planning documents; Assessment of Leon County's current and proposed budget documents.
- E-mail communication and formal interviews (n= five) approximately 20 minutes long with researchers conducting studies on vector control techniques and Mosquito Control District personnel on day-to-day operations.
- Evaluation of existing mosquito control programs in comparable Florida districts.
- Formal records request required by Leon County Mosquito Control Director to obtain public information on budgetary and operational records.

The history and the background information of mosquito control techniques were acquired through academic literature and popular media. Federal, state, local and industry association publications provide a solid foundation on how mosquito control became a public-sector responsibility. In addition, these publications provide information on the evolution of the

various processes used to control mosquitoes. Finally, they provide insight into the awareness of the ecological impact of such processes on the environment and economy.

The review of applicable regulations explains the responsibility and derived authority of these agencies to conduct abatement and control procedures to curb nuisance mosquitoes and vector spread in the face of public health concerns.

The review of CDC and EPA Pesticide Environmental Stewardship Program documents presents methods that are recommended for both the prevention of the spread of vector-borne diseases and the significance of wise, conservative approach to insecticides for mosquito control.

E-mails and conversations with researchers at the Florida Medical Entomology Laboratory have provided insight into abatement techniques. In addition, review of industry association publications has provided information on the current methods used by Mosquito Control Districts. Finally, a review and discussions with district personnel on current policies at the Leon, Gainesville, and Gadsden mosquito control districts have shown how current techniques and some of the latest non-pesticide innovations are being used and implemented at the local level.

### **Evaluation Criteria**

Four criteria are presented to evaluate the proposed policy options for public mosquito control programs: effectiveness, cost, environmental detriment and administrative feasibility.

**Effectiveness:** This is the quantitative ability to reduce vector carrying mosquito populations. To accomplish this, a determination of the success of mosquito control based on the techniques used (i.e., chemical control, integrated mosquito management, non-pesticide management) will be ranked. The ranking will be established by determining the impact on

mosquito populations, the effect on human and non-target species and the quantity of pesticides used (DACS, 2000; K. Etherson, personal communication, September 23, 2002, Kline, 2002).

**Cost:** The definition of this is the expenditures used to perform mosquito control within a defined area. Costs were determined by a fiscal review. This was performed by analysis of the cost of current policies compared to alternative policy approaches for running a mosquito control program (K. Etherson, personal communication, September 23, 2002, 2002; Leon County Annual Budget, 2001). A determination of the ranking is presented by evaluating the efficient use of limited funds and the allocation of those funds. Are resources spent mainly for standard abatement techniques? What amount of funding is allocated for education and new techniques?

**Environmental detriment:** The definition of this is the effects on non-target species, potential for chemical contamination in air, soil and water, and exposure concerns for humans. Policy options ranking will be determined by the effect on non-target species based on the techniques used for mosquito abatement (EPA, 2002; FCCMC, 1998; FMCA, 2000). The policies' respect for environmental stewardship (i.e., take into account the impact of abatement technique on the soil, water, flora and fauna) is considered. Finally, the impact on human quality of life and health is evaluated.

**Administrative feasibility:** The definition of this is the practical ease in which governmental representatives can implement the specific program (i.e., maintain current administrative policies, sensible execution of new policy alternatives). This is the balance between determining public resources availability and the publics' willingness to accept the specific option. The policy options will be ranked on the ability to actually implement the policy from an administrative approach.

The competing policy options are ranked based on current data available, interviews with program and research experts in the field, and objective analysis of the various options available.

The options are ranked on a scale from one to five, with one representing “poor” and five representing “very good” on the criteria presented. A limitation to this study is the inability to quantify the effectiveness and environmental detriment of the competing policy options.

However, there is enough subjective evidence to provide a useful ranking for each.

#### IV. MANAGEMENT POLICY OPTIONS

Section IV explains the three most viable policy options available to public officials for the control of mosquito populations: current programs, integrated mosquito management, and a non-pesticide based mosquito management. Each alternative policy is evaluated using the four criteria presented in section III. The options presented are intended to present alternatives to policy makers in order for them to make well-informed decisions to improve mosquito abatement for the well being of the citizens and environment.

##### **Option One: Current Policies and Programs**

Leon County Mosquito Control is one of 54 Mosquito Control Districts in Florida. Leon County operates a year-around program of mosquito control measures. The program provides a variety of abatement and educational services to reduce the level of mosquito populations and their threat to public health. Services include surveillance activities, truck and hand ultra-low volume spray applications, ground and aerial larvicide applications, domestic mosquito inspections and community education programs (Leon County Annual Budget, 2001).

**Effectiveness:** Leon County determines the effectiveness of its services by using performance measures. Based on a review of county records, primary indicators of a successful program include: percent of larviciding requests responded to within two working days; percent of fogging requests responded to within two days; percent of domestic mosquito control service requests responded to within two days. For the 1999-2000 fiscal year the percent accomplished were 97%, 91% and 98% respectively. In addition to the above measurement parameters, Leon County also determines the effectiveness of its program by determining the percent of schools that are inspected for mosquito breeding microhabitats and the percent of fourth grade classes

provided with a mosquito-reduction education program. For the 1999-2000 fiscal year the percent accomplished were N/A and 58%.

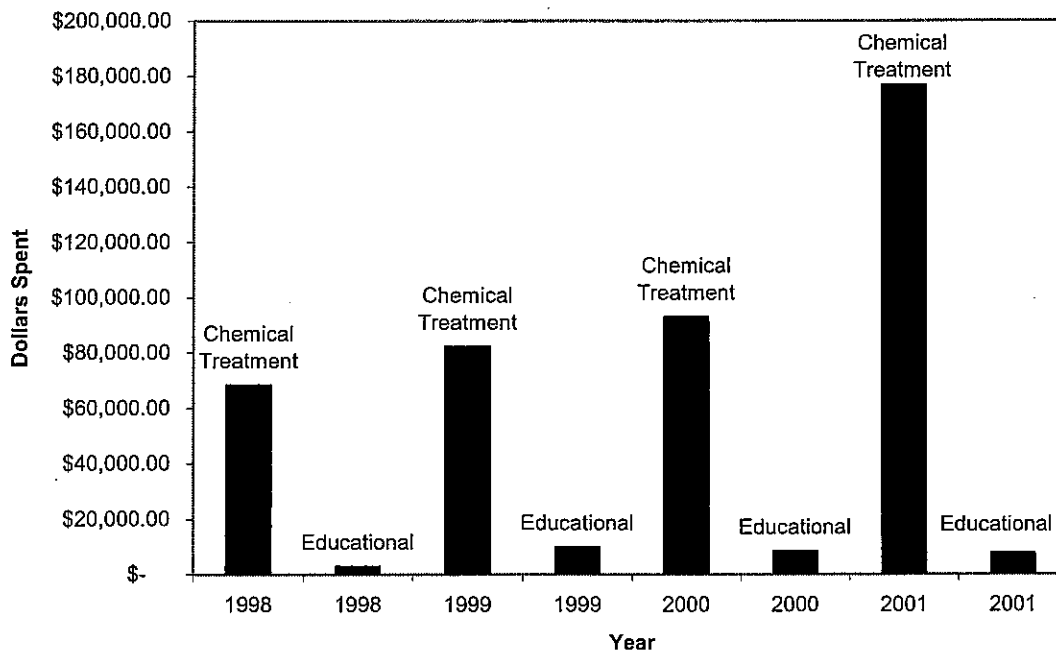
Upon a review of the pertinent information provided by Leon County, it appears that the program is geared towards providing county residents with larvicide or fogging service. The records presented suggest that there is emphasis on recording requests for service. There is very little emphasis on actual surveillance of target pest populations prior to enacting control measures or determining the effectiveness of the larviciding or fogging. Leon County uses pre-determined locations in the county to measure mosquito populations throughout the year. It is interesting to note the county uses the same six locations throughout the year. With the use of over 800 gallons of adulticide and 15,000 pounds of larvicide used in 2001-2002, county officials make no determination of the effect of the chemical treatment on target and non-target species.

In summary, the policy determines the effectiveness of service by relying on program performance measures (such as percent larviciding and fogging provided within two working days of request; percent schools inspected for breeding habitats and education programs provided to school age children in the fourth grade). Leon County uses no method to determine the effectiveness of their abatement techniques on the mosquitoes themselves. The county receives a ranking of two on effectiveness since there is no effort to determine the efficacy of the abatement technique.

**Cost:** Mosquito control programs operate either as independent districts or as part of a county government. For all of the districts (54) in Florida during fiscal year 1997-1998, their combined budget totaled \$64.3 million. Budget sizes range from \$24,000 to \$11.2 million (FMCA, 2000). Leon County operates a year-around program of mosquito control measures.

For the 2001-2002 fiscal year, there was \$454,290 allocated for the operation, representing a 1.9% increase from last year (Leon County Annual Budget, 2001).

The distribution of Leon County program funds was determined through information provided by the Leon County Budget Office. Staff provided four years of detailed records on operating cost for the program. The graph below presents a compilation of those detailed records, representing the funds spent for chemical application compared to the amount spent on education of the public on various mosquito topics.



**Graph One, Comparison of Expenditures in Leon County from 1998 to 2001**  
Source: Leon County Clerk of the Court 2002

As can be seen, the spending for educational initiatives has remained fairly constant while the expenditures on chemical control measures have increased steadily from 1998 to 2001. In addition to the county's education initiative, there is waste tire removal and treatment program. From reports furnished by the county, 424 tires were removed or chemically treated (LCMC, 2002). In summary, current Leon County policies allocate the bulk of their financial

resources towards chemical control of mosquito populations while allocating a small amount of capital for alternative methods of pest control. The current policy determines the allocation of funding based on cost of a chemical treatment program. There has been no effort to expand or alter from the status quo operation or deviate from the standard practice of financing the program, because of this the current program receives a ranking of two for cost.

**Environmental detriment:** Information provided showed that, for the county's adult mosquito control program, it used a combination of pyrethroids: permethrin and sumethrin. For the 2001-2002 reporting year, 12,861 acres of county land were treated with 825 gallons of this adulticide. In addition, 2,281 acres of wetlands were treated with over 15,300 pounds of larvicide.

The adulticides that are used are broad-spectrum insecticides. Many non-target species are adversely affected by the application of these insecticides. It has been acknowledged that pollinators and insectivores are adversely impacted either through direct contact or through loss of food sources through the application of insecticides for mosquito control (FCCMC, 1998). To date, the full extent of these effects has not been quantified; however, there is recognition by the American Mosquito Control Association and the Florida Mosquito Control Association that there are undesirable effects to these non-target species (EPA, 2002; FCCMC, 1998). In addition to the concerns of adulticides, larvicides also pose similar risk factors in the aquatic environment. The direct toxicity of non-target species and the loss of food sources for aquatic insectivores are acknowledged (FCCMC, 1998). In addition to the potential damage to non-target species, the U.S. Geological survey that found malathion in urban streams in north Florida (USGS, 1996). This is the same time frame that the county was using over 500 gallons of malathion annually for adult mosquito control (FDACC, 2001).

The effects of synthetic pesticides on human health are not fully understood. There are data that suggest that chronic exposure to low levels of these chemicals has an adverse effect on endocrine and immune system functions. It is recognized that current practices employed by Mosquito Control Districts do contribute to the chronic exposure of residents where these practices are maintained (CDC, 2001; FCCMC, 1998). Current techniques do not consider the potential adverse effects on the environment and are poor examples of environmental stewardship.

In summary, the consequences to the environment by maintaining current practices of mosquito control are acknowledged to have an undesirable effect on non-target species. The full impact of this practice has not and will not be completely understood or quantified in terms of ecological damage or human health. Since the current policy is based largely on chemical treatment and there is no evidence to suggest that the policy considers non-target adverse effects, potential contamination or impact on human health it receives a ranking of one for environmental detriment.

**Administrative feasibility:** From the records provided by Leon County Mosquito Control and the County Budget Office, the current practices of doing business have not changed dramatically for the county in the last five years. The administration of the Leon County Mosquito Control has not had any extreme shift in mission or policy implementation.

The program has had a steady stream of revenue from the County. The Director has maintained a program of responding to requests for service by citizens through providing adulticide fogging application and larvicide treatment. There are extensive records documenting the requests for service. In summary, the Leon County Mosquito Control current policies have

not changed significantly in the last five years. Since there is no significant alteration in the policy, the administrative feasibility of current programs is given the ranking of four.

To conclude with option one, the overall rankings received are, two for effectiveness, two for cost, one for environmental detriment and four for administrative feasibility. This gives a total score of nine for current programs.

### **Option Two: Integrated Mosquito Management Policy**

The idea behind a successful, integrated mosquito management program is to use all available management methods in an environmentally sound manner to control mosquito populations. Such a typical program first determines the species of mosquitoes and their abundance and then uses the most efficient and effective means to control them. The techniques range from water management and sanitation programs for the control of breeding sites and larval populations to the use of larvicides and adulticides. An important feature of integrated mosquito management is the surveillance of populations pre- and post-abatement technique. Finally, the inclusion of public education is a valuable technique to help reduce domestic breeding sites and effectively explain mosquito disease life cycles (education is an effective tool that creates awareness of possible problems and provides insight to prevent or alleviate such problems).

**Effectiveness:** A review of various mosquito control districts, one was found that attempted to implement an integrated mosquito management program, it was found that Gadsden County Mosquito Control was a good example of a district that practiced such a program. An interview with the Director revealed that Gadsden County practiced the techniques of integrated mosquito management (FDACS, 2001; MacDunn, personal communication, October 20, 2002).

Site visits were conducted prior to any abatement techniques to determine the source of the mosquito problem. During these site visits, Gadsden County personnel discussed with residents sources of breeding sites and attempts were made to identify and eliminate these sources. It was discovered during these site visits that residents were often the source of their own mosquito problems. It was estimated that 60-70% of the problems were created by the residents requesting relief from those mosquitoes (MacDunn, personal communication, October 20, 2002). It was often found that after removal of breeding sites through source reduction, only one treatment of adulticide was needed to return the mosquito population to levels that natural predators could control.

Gadsden County Mosquito Control also works in conjunction with the Public Works Department to remove standing water from drainage ditches in order to remove potential breeding sites. The addition of minnows and tadpoles in standing water that could not be drained maintains a constant source of predators for emerging larval stage mosquitoes. In short, Gadsden County Mosquito Control provides effective mosquito abatement with integrated mosquito management techniques; as a result, there is less reliance on synthetic pesticides to control mosquito populations. The integrated mosquito management policy receives a ranking of four for effectiveness since the program attempts to determine the efficacy of the abatement techniques used, the program attempts to minimize the adverse effects on non-target species and minimizes the use of pesticides as a treatment option.

**Cost:** Gadsden County Mosquito Control operates as part of Gadsden County government. The use of integrated mosquito management techniques is, in part, out of funding necessity. The operation has limited staff and funding. For the 2001-2002 fiscal year, funding was increased to \$84,000 from \$46,000. This represents the change from a part-time to a full-

time position. In the interview, the Director pointed out that the County is a relatively rural area and funding is limited for all county operations (MacDunn, personal communication, October 20, 2002).

As a result, there is cooperation between the various departments to complete jobs that need to be accomplished. An example of this is the use of backhoes to clear drainage ditches: such tasks are passed on to county departments that have the equipment to perform such duties. The Director also mentioned that it is much more cost effective to implement integrated mosquito management techniques that only require man-hours instead of pesticides that are much more expensive management technique. In brief, the use of an integrated mosquito management program proves to be more cost effective for Gadsden County then the standard policies and programs used by neighboring Leon County with its reliance on chemical control measures. The policy option of integrated mosquito management receives a ranking of four in cost based on the fact that the county does a sound job in allocating limited funding for its program. The county is willing to seek alternative sources to accomplish task and the willingness to allocate funding for biological measures for abatement techniques.

**Environmental detriment:** Information provided by Gadsden County and Department of Agriculture and Consumer Services showed that for adult mosquito control Gadsden County uses malathion. For the 1999-2000 reporting year, 5,407 acres of county land were treated with 29 gallons of adulticide. In addition, 6.25 acres of wetlands were treated with less then one gallon of larvicide (FDACS, 2001). Gadsden County continues to rely on malathion until such time that it proves to be ineffective on adult mosquito populations (MacDunn, personal communication, October 20, 2002).

The interview with the Gadsden County Mosquito Control Director indicated that allies in the control of mosquitoes were the natural fauna that use them as a food source. He understood the potential adverse effects that synthetic pesticide could have on the terrestrial and aquatic species that feed on mosquitoes (MacDunn, personal communication, October 20, 2002). The county's philosophy is to resort to spraying only when other abatement methods have failed, and then spray with the intent to re-establish a health balance between mosquitoes and their predators. Further, resort to spray only occurs when the mosquito population has an explosion due to increased breeding sites and natural predators are unable to keep them in check. The quantity of pesticides that are applied greatly reduces the chances of adverse effects on non-target species. The impact of this techniques greatly reduces the chance of chemical contamination of soils and water. As a result, the nature of such a program demonstrates its concern to the surrounding environment making this program a good example of environmental stewardship. In addition, the effects on human health from pesticide applied for abatement is greatly reduced since the quantity is substantially decreased.

In short, Gadsden County's integrated mosquito management program first relies on non-chemical techniques to control mosquitoes. As a result, pesticides for the control of mosquitoes is used as a last-resort method. The impact of this program on the environment and human health is greatly reduced because of this management philosophy. Integrated mosquito management receives a ranking of three for environmental detriment since this policy does take into consideration the effects on non-target species, the environment and human health considerations. This ranking does reflect that there is still an impact on these systems, however it is much better than current policy options.

**Administrative feasibility:** Gadsden County runs a small mosquito control program.

The most significant change that has occurred this fiscal year is the conversion of the Director to full-time status for the program (the county has provided funding for such a shift in personnel). With this change in staffing, additional resources can be utilized to administer and provide for integrated mosquito management program, since such a program requires greater coordination of personnel.

Although county resources are limited, Gadsden County feels that the policy options they are implementing meet current needs. The Director did mention that Gadsden County does rely on results from Leon County's encephalitis monitoring program as a cost-saving method (MacDunn, personal communication, October 20, 2002). Gadsden County is able to effectively make site visits pre- and post-abatement technique application. Citizens have responded in a positive manner to this approach of mosquito control. In summary, Gadsden County will be able to administer the mosquito management program more effectively with the change in staffing that has occurred. A small program like this relies heavily on its personnel to deliver effectively the services on which the County is dependent and which the County requires. The program receives a ranking of four on administrative feasibility since there is a concerted and effective effort to implement this option.

In conclusion option two, integrated mosquito management fared well in the effectiveness, cost and administrative feasibility criteria receiving a ranking of four in each. It received a ranking of three in environmental detriment since the policy does employ the use of some pesticides. This gave option two an overall score of 15.

### **Option Three: Non-pesticide Based Mosquito Management**

The concept behind a non-pesticide based mosquito management program is to use all available non-pesticide management methods control mosquito populations. The techniques used with this program are similar to option two, integrated mosquito management. There is the distinct difference with option two, in that there is use no pesticides employed in the management of mosquito populations. By the very nature of such a program, there is minimal damage to non-target species or chemical contamination of soil and water. A program that employs such principles first determines the species of mosquitoes and their abundance, then uses the most efficient and effective non-pesticide means to control them. The techniques used include water management and sanitation programs for the control of breeding sites and larval populations and the use of effective adult mosquito traps. An important feature of a non-pesticide based mosquito management program is the surveillance of populations pre- and post- abatement technique application. Finally, as with integrated mosquito management, the inclusion of public education is a valuable technique to help reduce domestic breeding sites and effectively explain mosquito disease life cycles.

The use of a non-pesticide based mosquito management program is a relatively new concept. The effectiveness of source reduction techniques is well established in the literature. The integration of non-pesticide means of capturing adult mosquitoes in populated areas is a new approach for the control of nuisance and vector-carrying mosquitoes. The developments of such traps for commercial use have increased because of the publics desire to control mosquitoes without the use of pesticides (Kline, 2002).

**Effectiveness:** Through reviewing of literature and news media, one district has been identified as attempting to implement it on a small scale--Gainesville Mosquito Control District. Gainesville has taken the initiative to put into practice the concept on non-pesticide based

mosquito management by purchasing and using adult mosquito traps in as an alternative to pesticide applications for population control. Research has indicated that these traps are an effective alternative to pesticide applications for the control of adult mosquito populations. Field trials are still in progress to demonstrate the usefulness of these traps as effective alternatives to traditional control techniques. The Gainesville Mosquito Control, in conjunction with the University of Florida and the United States Department of Agriculture, will be involved in a two-year field study beginning in the spring of 2003 to determine the effectiveness of trap (K. Etherson, personal communication, September 23, 2002). The impact on such abatement techniques has the least impact on human and non-target species of the tree options presented.

In summary, Gainesville Mosquito Control has taken the initiative to implement a new and innovative approach for mosquito control in populated areas. The long-term effectiveness of such techniques on mosquito populations has yet to be established. This option receives a ranking of four for effectiveness since the techniques used are geared at the specific pest of interest and there is no substantial impact on non-target species.

**Cost:** The Director of Gainesville Mosquito Control indicated that the mosquito traps are approximately \$1,200 each. The district has purchased ten units last fiscal year and plans to purchase an additional ten for 2002-2003 (K. Etherson, personal communication, September 23, 2002). The Director indicated that it is difficult to justify the allocation of the money but that the decision was made to try this innovative method. The Gainesville City and County Commissions have made a commitment to reduce their dependency on chemicals used for mosquito control. Gainesville Mosquito Control justified the cost of implementation by comparing the cost of spraying one service areas, verses the cost of the traps in that area. The district is optimistic that the traps will be paying for themselves in a few years (K. Etherson,

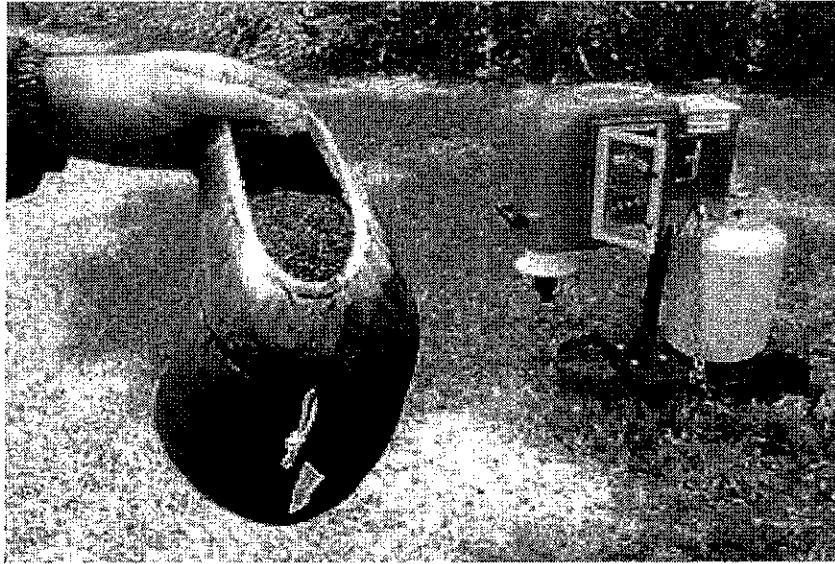
personal communication, September 23, 2002). The only other problem noted by Gainesville Mosquito Control is that because of the cost of each unit, concerns for vandalism and theft have come up. To dispel these concerns, all traps are being placed on City-owned property.

In short, the greatest concern in establishing a non-pesticide based mosquito management program is the initial start-up cost. Gainesville Mosquito Control has justified the expense and demonstrated that, in the near future, the costs saving to the program will warrant the initial expenditure. This option receives a ranking of four in cost since the district has made the decision to invest money in a program that will provide a return on the investment in long-term cost by eliminating the re-occurring outlay of traditional pesticide techniques

**Environmental detriment:** The use of these methods for mosquito control has the smallest effect on ecological systems. The reliance on traditional chemical means for well over 60 years has had an impact on the natural balance of predator and prey. It is acknowledged that before the introduction of traditional mosquito control techniques, much of Florida was considered uninhabitable; however, with experience and scientific observations, it has been documented that broad-spectrum pesticides pose a significant risk to ecological systems and human health (EPA, 2002; FCCMC, 1998; Tvedten, 2000). This policy option has the least effect on non-target species. There is no concern for air, soil or water contamination since the use of pesticides is eliminated. In addition, the respect and concern for environmental stewardship is evident from the abatement techniques practiced. Finally, these practices have the slightest impact on human health.

With the introduction of new abatement techniques, it is up to public health officials to integrate and implement these methods and phase out antiquated processes. This needs to be done to limit the extent of damage to fragile ecosystems as well as the health of the public. The

traps being used by Gainesville specifically capture biting insects (see Picture 1). In summary, non-pesticide based mosquito management methods are the least harmful and pose the slightest risk to ecosystems and human health. As a result, this option receives a ranking of five for environmental detriment.



Picture 1, A Mosquito Magnet Trap one days worth of 250,000 dead mosquitoes at National Park Service quarter in Flamingo Florida by AP Tom Ervin in St Petersburg Times, August 18, 2002.

**Administrative feasibility:** Of the policy options presented, this one is the most difficult as far as administrative feasibility is concerned. It is difficult for fiscal administrators to spend public resources on unfamiliar innovative techniques. The most difficult obstacle is to get Mosquito Control Districts to re-think and redirect their management methodology.

It has been demonstrated by the Gainesville program that such obstacles are not insurmountable. Gainesville has successfully demonstrated that the public is willing to allow officials to try innovative techniques in the control of mosquitoes. In addition, there is the financial resolve to support such methods. The implementation of new methods in mosquito abatement has required that administrators re-evaluate personnel duties and assign new responsibilities. Administrators and staff need to change from the status quo of doing business.

This option requires extra effort from all staff members and a willingness to change from old techniques. If such measures are presented in a professional manner and the staff works towards a common goal, then these measures should not present great difficulty to implement. In summary, the non-pesticide based mosquito option would be the most difficult from an administrative view. This option receives a ranking of three in administrative feasibility since there is the extra responsibility of program leaders to implement new policies and techniques.

In conclusion option three receives a ranking of four in the effectiveness and cost criteria; the criterion of environmental detriment a ranking of five and a three for administrative feasibility. The overall score of 16 was given to option three, making this the best choice for policy makers considering a shift in their current district programs.

## V. CONCLUSION

This report has presented three alternative policy options for the control of mosquitoes at the district level. Each policy has been evaluated based on effectiveness, cost, environmental detriment, and administrative feasibility. Table 1 summarizes the results of the evaluation.

**Table 1 Summary of Alternatives and Evaluation Criteria**

	Effectiveness	Cost	Environmental Detriment	Administrative Feasibility	Total
<b>Current Program</b>	2	2	1	4	9
<b>Integrated Mosquito Management</b>	4	4	3	4	15
<b>Non-Pesticide Mosquito Management</b>	4	4	5	3	16

Ranking Scale: 1 to 5, with 1 being poor and 5 being very good

The policy options considered and ranked based on the above criteria present a range of choices for public administrators. The fact remains that the population of mosquitoes needs to be kept under control not only from a nuisance view, but also, more importantly, from a public health standpoint. Based on the criteria, it would be advantageous for district mosquito control programs to move away from the standard chemical control measures to integrated mosquito management and finally to non-pesticide based mosquito management techniques.

The first option of current program effectiveness remains questionable in that the mosquito populations are constantly able to adapt and become resistant, thriving in the wake of new chemical assaults. Even the American Mosquito Control Association acknowledges that “insects have the innate ability to stay one step ahead of us by developing resistance to a relatively few products available” (FCCMC 1998). The solution to such a problem is not a change in chemical regiment, but a change in approach to solving the problem of mosquito control.

The allocation of funding of current programs is based on the amount of money necessary to conduct the chemical-spraying program. There has been no effort by the local district to invest in alternative control measures. It is evident after reviewing the Leon County Mosquito Control operating budget for the past five fiscal years that the program does not intend to change the way money is allocated. Next, the affects of current chemical treatment practices present the greatest risk of environmental detriment. Finally, the current program requires the least amount of work for administrators. Administrative feasibility is ranked high because this approach carries the weight of tradition ("do nothing different") to maintain current policies.

The second option of integrated mosquito management has been demonstrated by Gadsden County Mosquito Control to do an effective job. By implementing practices recommended by the CDC, EPA, AMCA and FMCA, the need for pesticide application is greatly reduced but the success of these abatement techniques is high. The money spent on such an operation is not focused on spray schedules, but on the entire range of techniques utilized in an integrated program. The amount of damage such a program has on the environment is greatly reduced since the need for chemical applications is significantly decreased. Finally, as Gadsden County has demonstrated, the ability to effectively administer such a program is efficient use of limited county resources.

The third option of non-pesticide based mosquito management holds great potential as the best overall management scheme. The effectiveness of such a program can be projected from the known success with integrated mosquito management results along with the initial study results of adult mosquito traps. Gainesville has demonstrated that even a small district can manage the initial investment of such a program. There is no doubt that such a program has the least impact on the environment. What is required is the initiative and readiness of

administrators to lobby for alternative methods and the willingness to allow such methods to demonstrate their effectiveness.

The final assessment of the options indicates that it is in the best interest of public health official policy, and the communities that are served to steer district mosquito control programs to an integrated mosquito management and, ultimately, to a non-pesticide based management program. The antiquated method of chemical control needs to be phased out of existence. Not only does such a move provide for greater mosquito population control, it makes good fiscal, administrative, health and environmental sense. It is not often a policy maker can reap such benefits from a strategic shift in approach when tackling a problem.

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## APPENDIX

**PESTICIDE ENVIRONMENTAL STEWARDSHIP PROGRAM**  
**"PARTNERSHIP STRATEGY DOCUMENT"**  
**FOR THE FLORIDA MOSQUITO CONTROL ASSOCIATION**

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**I. INTRODUCTION TO THE FLORIDA MOSQUITO CONTROL ASSOCIATION'S (FMCA) STRATEGY DOCUMENT.** The FMCA recognizes the importance and benefits of the EPA's Pesticide Environmental Stewardship Program (PESP) and is interested in becoming a "PESP Partner under the American Mosquito Control Association's (AMCA) Auspices". This FMCA Strategy Document describes the FMCA's current policies and organizational structure and presents an overview of its members' general control practices. This document will also describe how the FMCA intends to continue and improve its current efforts of encouraging Florida mosquito control agencies to undertake mosquito control management with a keen appreciation of the environment. This goal will be accomplished through programs of encouraging environmentally sound source reduction projects and reducing pesticide risk through the responsible use of mosquito control chemicals.

**II. OBJECTIVES, PRINCIPLES AND ACCEPTED PRACTICES OF THE FMCA.** The FMCA is a non-profit association made up of approx. 300 mosquito control workers, entomologists, scientists, industry representatives and laypersons interested in the biology and control of mosquitoes and other arthropods of public health importance.

**A. THE OBJECTIVES OF THE FMCA ARE:**

1. To assist in promoting control of disease transmitting and pestiferous mosquitoes and other arthropods of public health importance;
2. To provide for the scientific advancement of members; and

3. To develop and extend public interest and support for the control of mosquitoes and other arthropods of public health importance.

**B. THE FMCA'S GUIDING PRINCIPLES INCLUDE:**

1. *Protecting the environment.* Because the FMCA recognizes that some methods and materials used in the control of mosquitoes and other arthropods of public health importance can have adverse effects on the environment, the FMCA has adopted the principle that effective control of disease vectors and pestiferous mosquitoes should be accomplished by methods that pose the least possible hazard to man and the environment.

2. *Responsibility for control.* The FMCA has taken the position that every citizen has the responsibility to eliminate conditions on their premises that are capable of breeding mosquitoes. The control of mosquitoes originating on non-residential areas is a public responsibility; moreover, it is the responsibility of the State to promote surveillance of arthropod-borne disease by counties and districts, and to give scientific training, certification and guidance to individuals involved in the control of mosquitoes and other arthropods of public health importance.

3. *Guidelines for control.* As a general principle, the FMCA recognizes that the prevention of breeding is the preferred procedure for control of mosquitoes and similarly important arthropods. However, in order to protect Florida's public health and economy, it is recognized that temporary control measures using pesticides are often necessary for control of disease vectors and pestiferous arthropods. In fact, in some circumstances, temporary measures may be the only effective control means that can be utilized. In order to conduct control operations to not only offer maximum protection to the environment but also protect the best interest of neighboring counties and districts, the FMCA encourages using recommendations of the Florida Dept. of Agriculture and Consumer Services (FDACS), Bureau of Entomology and Pest Control in all control programs.

4. *Inspections.* All insect control programs should be based upon results of properly conducted surveillance programs which serve to define the problem, justify the control operations, and evaluate the results. Haphazard or routine control operations, which are not based on adequate evidence of need for control, are not condoned by the FMCA.

**C. THE FMCA'S ACCEPTED PRACTICES ARE:**

1. *Control by insecticides.* It is the FMCA's policy to use only those approved insecticides that scientific data show are effective and safest for humans and wildlife, as approved by the EPA and FDACS. As a routine practice, larviciding is preferred to adulticiding where feasible; however, it is recognized that local circumstances might make this procedure impractical. In order to avoid or delay insecticide resistance, synthetic organic pesticides used as adulticides shall not be used as larvicides. For the same reason, every effort must be made to avoid the use of organic pesticides for the destruction of newly emerged adults over extensive areas at the breeding site when these chemicals normally are used for adulticiding.

2. *Source reduction.* Typically, water management is the preferred method of source reduction for control of freshwater and salt marsh mosquitoes. However, federal and state regulations must be followed before any water management activity is initiated in any wetland.

3. *Other methods.* When biological or other methods that might be more compatible with the environment are shown to be effective and economically feasible for the control of mosquitoes and other arthropods of public health importance, these shall be used as the principal control agents or integrated control options.

The above-mentioned FMCA goals, principles and accepted practices are consistent with those of the PESP program by encouraging non-chemical control measures when possible and reducing pesticide use/risk where practicable.

**III. OVERVIEW OF A "TYPICAL" FLORIDA MOSQUITO CONTROL PROGRAM.** As is common throughout the U.S., it is not possible to provide a concise overview which is representative of all mosquito

control programs in a State such as Florida. However, certain program components are common to most of Florida's 51 governmental mosquito control programs which receive limited State funding through FDACS. These agencies are either independent districts or part of local county government. During 1997-98, their combined budgets totaled \$64.3 million. Program budgets range in size from approx. \$24,000 to \$11.2 million. Florida mosquito control agencies typically use an Integrated Pest Management (IPM) approach combining source reduction, larviciding and adulticiding with control decisions being based on various types of surveillance. Biological control is also used but to a limited extent. An integrated control approach is necessary during routine pest/nuisance mosquito outbreaks and the occasional situation of an outbreak of a mosquito-transmitted pathogen such as St. Louis Encephalitis (SLE) or Eastern Equine Encephalitis (EEE). Most programs receive some limited funding from the Fla. Department of Agriculture and Consumer Services' Office of Entomology and Pest Control, thus consequently regularly report to them on budgetary and chemical use matters.

Continuing education for employees is handled by local mosquito control offices, and regionally and statewide, through the FMCA's Dodd Short Courses. Periodically, courses are offered at the John A. Mulrennan Sr. Research Laboratory (Fla. A&M University/Panama City) and the Florida Medical Entomology Laboratory (University of Fla./Vero Beach).

The Dodd Short Courses are nationally recognized as an excellent training forum for mosquito control workers and provide the training and opportunity for employees to take the FDACS' examination to become certified in Public Health Pest Control, a certification achievement obtained by many Florida mosquito control workers. FDACS also provides training for this examination around the state on a need basis. Regional programs concerning aerial chemical equipment and applications (a.k.a. fly-ins) are periodically held around the state and sponsored by the FMCA's Education Coordination Committee (ECC). In regard to keeping the public informed, local mosquito control office programs vary, from some which provide presentations to service organizations, church groups and schools when requested, to others which support full-time personnel dedicated to education. These various educational initiatives are providing for both an increased professionalism among mosquito control workers and a better informed public thus providing significant progress in attempting to reduce pesticide use and risk.

**A. SOURCE REDUCTION.** As stated above, the FMCA supports source reduction where possible as the primary mosquito control method. Since the early 1900's source reduction projects have been used in Florida in attempts to control the horrendous mosquito populations occurring both in coastal and inland counties. Source reduction efforts in Florida include sanitation (in fact, a Statewide tire removal program), Impoundment Management along east-central Florida's Indian River Lagoon, Open Marsh Water Management (OMWM) on both coasts of Florida and ditch maintenance programs in both freshwater and salt marsh habitats.

**1. SANITATION.** In Florida, containers and tires are major producers of *Aedes albopictus*. Many local mosquito control agencies through public education stress the importance of removal of such containers and tires. Since 1992, FDACS has administered a Statewide program (of approx. \$1.5 million annually) supporting the collection and discarding of waste tires whereby mosquito control agencies who choose to participate, receive yearly financial assistance. The total tire weight collected by Florida mosquito control programs between 1994-96 totaled 9010 tons.

**2. IMPOUNDMENT MANAGEMENT.** Impoundments are salt-marsh mosquito-producing marshes around which dikes were constructed during the 1950's and 1960's, thus allowing water to be pumped onto the marsh surface from the adjacent estuary. This eliminates salt-marsh mosquito ovipositional opportunities on the impounded salt marsh and effectively reduces their populations. 40,000 acres of salt marsh impoundments were constructed along Florida's east-central Indian River Lagoon. Over the past 15 years a concerted, interagency effort has been made to manage these marshes for both mosquito control and natural resource interests. Rotational Impoundment Management (RIM) is one of the techniques developed to minimally flood the marsh during the summer months and then use flapgated culverts to reintegrate impoundments to the estuary for the remainder of the year thus allowing the marsh to provide many of its natural functions.

**3. OPEN MARSH WATER MANAGEMENT (OMWM).** Ditching as a source reduction mosquito control technique has been used in Florida since the 1920's. A salt marsh source reduction technique which

originated in the Northeast U.S. and is being applied in some Florida salt marshes is Open Marsh Water Management (OMWM). OMWM is a technique whereby mosquito producing locations on the marsh surface are connected to deep water habitat (e.g., tidal creeks, deep ditches) with shallow ditches. Mosquito broods are thus controlled without pesticide use by allowing larvivorous fish access to mosquito-producing depressions or conversely the draining of these locations occurs before adult mosquitoes can emerge. OMWM can also be a technique whereby hydrological connection between an impoundment and the estuary is improved allowing the impoundment to remain open to the estuary longer thus improving its natural resource benefits. The use of shallow ditching (ditches approx. 3 ft. or less in depth rather than the deep ditching used in years past) is considered more environmentally acceptable because with shallow ditches, less unnatural hydrological impacts occur to the marsh.

**B. LARVICIDING.** Larviciding is an important component of most Florida mosquito control programs. Several materials in various labeled formulations are currently used. These include the organophosphate temephos (Abate), several "biorational" larvicides - *Bacillus thuringiensis israelensis* (*Bti*, a bacterial larvicide), methoprene (Altosid, an insect growth regulator), and several oils (Golden Bear-petroleum based and Bonide-mineral based).

Larviciding is conducted both from the ground via hand sprayers, 4WD vehicle-mounted sprayers and all-terrain-vehicle (ATV) mounted sprayers and from the air using both fixed wing and rotary aircraft. Of the above-listed larvicides, in various Florida locations, all are applied both from the ground and air.

While historical insecticide use information is difficult to interpret because of changing chemical formulations, a recent summary documented the use of mosquito larvicides in Florida from 1975 to 1995. It demonstrated that in 1995, *Bti* use was at almost 1500 lbs of active ingredient (AI) per year, Altosid (=methoprene) use was at 1335 lbs AI per year and Abate (=temephos) use totaled approx. 7000 lbs. AI. Contrasting these 1995 larvicide use figures with 20 years earlier, demonstrates that in 1975, Altosid had just come on the market, *Bti* was non-existent as a commercial product and Abate use was reported at 3776 lbs AI per year.

**C. ADULTICIDING.** Adulticides currently used in Florida include several organophosphates - malathion, naled (=Dibrom), chlorpyrifos (=Dursban) and fenthion (=Baytex), some natural pyrethrins, synthetic pyrethroids (permethrin, resmethrin and sumithrin) and a carbamate (bendiocarb).

The same insecticide use survey referred to above demonstrated that in 1995, fenthion (Baytex) use measured approx. 75,000 lbs. AI, naled (Dibrom) use was approx. 306,000 lbs. AI, malathion use was 490,000 lbs. AI, permethrin use was 1,000 lbs. AI and resmethrin use was approx. 2500 lbs. AI.

In Florida, both aerial and ground adulticiding is conducted, based on surveillance verifying the need to spray. ULV (Ultra-Low-Volume) is the predominant ground (truck-mounted) and aerial (via fixed-wing or rotary aircraft) technique used. Only a few agencies employ thermal fogging.

**D. BIOLOGICAL CONTROL.** Biological control (=biocontrol), while popular in theory because of its potential to be host-specific with virtually no non-target effects, is used sparingly because of its limited effectiveness. In Florida, larvivorous fish (typically *Gambusia* species), are the only extensively used biocontrol agent.

**IV. FMCA AND THE STATE OF FLORIDA'S ENVIRONMENTAL STEWARDSHIP PROGRESS.** Since the late 1970's, significant progress has been made in merging mosquito control management with environmental stewardship goals. Below are several of these initiatives:

**A. INTERAGENCY COOPERATION.** During the late 1970's and early 1980's, considerable disagreement occurred between Florida's mosquito control agencies and agencies responsible for environmental protection. These disagreements were primarily over: 1) how to manage salt-marsh impoundments and, 2) the non-target effects of aerial adulticiding. These conflicts resulted in the legislative formation (Chapter 388, Florida Statutes) of the Florida Coordinating Council on Mosquito Control (FCCMC) and its Subcommittee on Managed Marshes (SOMM). It is the FMCA's responsibility to appoint two mosquito control directors to the Council.

The FCCMC is an advisory body established to assist in resolving disputes over mosquito control management, in particular with arthropod control on publicly owned lands. FCCMC is also expected to identify and recommend research priorities. SOMM, also an advisory board, was established to provide technical guidance on marsh management plans and to review source reduction research proposals. Over their 14 year existence, these two committees have played an integral role in resolving conflicts and promoting environmental stewardship in matters involving mosquito control management.

*White Paper on Florida Mosquito Control.* In the Spring of 1995, the U.S. Environmental Protection Agency (EPA) requested that the Florida mosquito control community develop a "White Paper on Florida Mosquito Control". The intent of this document, which is scheduled to be published later this year, is to provide a "snapshot" of Florida mosquito control during 1996-97 with the goal of developing recommendations on how mosquito control chemical use and risk can be reduced in the future. While this request was not directly from the EPA's PESP Program, it is right in line with PESP's goals and objectives. The White Paper, which is approximately 200 pages in length and written by over 20 contributing authors, has now been adopted by the FCCMC and is currently in the process of being professionally edited.

*White Paper Conference.* As a finale for this ambitious project, the Steering Committee for this White Paper document, is organizing a several day conference during May 1998 to bring the White Paper development to a conclusion and to provide a forum where discussions can occur on: current issues facing mosquito control, potential future problems and opportunities, and the development of recommendations on how to solve such issues. This conference, which will coincide with the Spring Meeting of the Florida Mosquito Control Association, will include several sessions with invited speakers followed by panel discussions. After the conclusion of the meeting, abstracts of the speakers' presentations will be published in a conference proceedings.

**B. WETLANDS MANAGEMENT.** Since the ecological importance of wetlands was documented in the 1970's, mosquito control in Florida has worked to improve environmentally sensitive management of these habitats. These improvements in wetland management began with changes to impoundment management practices encouraged by SOMM and based on interagency research. This research was initiated in the early 1980's by funding through the federal Coastal Zone Management Program with supplemental funds from numerous organizations including the Florida Dept. of Health & Rehabilitative Services, mosquito control agencies, private research institutions and development interests. Today, over half of the 40,000 acres of impoundments along the Indian River Lagoon are managed for both mosquito control and natural resource considerations. As the privately-owned wetlands continue to be publicly purchased, through cooperative funding by the State's Surface Water Improvement and Management (SWIM) Program, the increased implementation of Rotational Impoundment Management (RIM) and Open Marsh Water Management (OMWM) will be possible in these environmentally sensitive areas.

*Workshops on Salt Marsh Management and Research.* With the goal of disseminating information on progress in salt marsh management and research, on three occasions (1988, 1992, 1996), 4-day "Workshops on Salt Marsh Management and Research", sponsored by the FMCA, SOMM, and other interested organizations, have been held to bring interested mosquito control workers, regulatory personnel and researchers up-to-date on salt marsh management and research findings. Each of these 3 workshops have had international participation with approx. 100 individuals at each meeting with a proceedings of the meeting published as a Bulletin of the FMCA. Educational forums such as this are helping to fine-tune source reduction efforts and thus reduce the need for pesticide use in environmentally sensitive habitats.

**C. WASTE TIRE COLLECTION PROGRAM.** As discussed in III.A.1. above, through the FDACS administered Statewide tire collection program, tremendous strides have been made in cleaning up waste tires illegally dumped around the State. As previously mentioned, the tire weight collected during 1994-96 by Florida mosquito control programs totaled 9010 tons. Since virtually all of these tires are capable of producing mosquitoes, proper tire disposal is helping to reduce mosquito control chemical applications to the adult mosquitoes which would be generated by them.

**D. USE OF BIORATIONAL LARVICIDES.** Florida has been a leader in the use of biorational larvicides (*Bti* and the insect growth regulator methoprene) with their use increasing substantially over the past 20

years. The methodology of adsorbing methoprene to sand (=Altosand) to ensure that the material penetrates dense mangrove canopies was developed in Florida in the mid-1970s.

**E. AERIAL ADULTICIDING.** In Florida, when there is a possibility of chemical deposition on public lands which are determined to be environmentally sensitive and biologically highly productive, the State has developed criteria for aerial adulticide applications. These criteria, established in Chapter 5E-13 of the Florida Administrative Code, state that: only specific areas with a documented need be sprayed; labels must be strictly followed; applications must be timed to coincide with periods of mosquito activity; equipment must be properly calibrated; open waters must not be treated, and appropriate records must be kept for a minimum of 3 years. These criteria help to assure that the responsible use of aerial adulticiding is employed in Florida.

**CHEMICAL EXPOSURE CONCERNS.** Some individuals in Florida are genuinely concerned about exposure to chemicals, whether it be from mosquito control or other sources (e.g., residential lawn sprays, agricultural spraying including anti-medfly applications). Some of these persons have requested consideration of their concern by mosquito control offices. Virtually without exception, mosquito control agencies notify individuals with chemical exposure concerns prior to adulticiding their neighborhood and also, during their routine spraying operations, spray truck drivers are instructed to take measures to try and avoid accidentally spraying pedestrians. These measures display a genuine concern for the desires of a portion of the population to avoid exposure to chemicals.

**F. ENCEPHALITIS SURVEILLANCE PROGRAM.** Since 1978, many mosquito control offices around the State have participated in a St. Louis Encephalitis (SLE) and Eastern Equine Encephalitis (EEE) virus surveillance program. This program, which uses chickens as a sentinel animal, allows participating agencies to submit sentinel chicken blood sera to the Florida Dept. of Health and Rehabilitative Services' Tampa Virology Lab for detection of SLE and EEE antibodies at no cost. This information allows mosquito control and public health agencies to be aware if SLE or EEE virus transmission is occurring thus allowing the local agencies to take appropriate actions which usually include notifying the public that an increased risk of virus transmission exists and also increasing adulticiding activity. Currently approximately 20 agencies in Florida are participating in this program which helps in defining when a public health need exists for chemical applications directed at mosquitoes carrying the SLE or EEE virus.

**G. EDUCATION.** The FMCA annually sponsors the Dodd Short Courses, a week-long program to thoroughly train mosquito control personnel (from field workers to senior management) concerning all aspects of mosquito control. At these courses, which are annually attended by approx. 400 individuals, mosquito control workers are also offered the courses necessary to take the Fla. FDACS' examinations for Public Health Pest Control certification. These courses also provide the opportunity for mosquito control employees to maintain this certification by participating in the various courses offered. These courses, along with public education initiatives provided by local mosquito agencies, helps maintain the level of professionalism among mosquito control workers and also keeps the public properly informed of mosquito control issues.

**H. RESEARCH.** Since the early 1980's, the FMCA's Research Advisory Committee has helped identify mosquito control research that is needed in Florida. Over the past several years, through the State's Waste Tire Fund, \$250,000 has been made available for mosquito control research to be conducted primarily by scientists at the University of Florida's Florida Medical Entomology Laboratory and Florida Agricultural and Mechanical University's John A. Mulrennan Sr. Research Laboratory. This fund is administered by FDACS and provides the opportunity for projects to be funded which help identify ways where the goals of reduced pesticide use and risk can be achieved.

**V. PROPOSED FMCA INITIATIVES TO MEET PESP GOALS AND OBJECTIVES.** To meet the PESP goals of reduced pesticide risk/use in the future, the FMCA will accomplish this by encouraging the FMCA membership to incorporate certain fundamental initiatives in their programs wherever possible, much of which is a furtherance of the ongoing efforts described above. These items will include:

**A. SOURCE REDUCTION.** The FMCA will continue to stress the importance of properly designed source reduction projects. As long as State funds continue, this will include continued participation in the Waste Tire

Collection program. Also, in environmentally sensitive marsh habitats, the FMCA will promote the importance of accomplishing mosquito control objectives *and* improving fish and wildlife habitat. The primary multi-agency forums for this will continue to be the FCCMC and its SOMM. The techniques to accomplish this in salt marsh environments include further refining and implementation of Rotational Impoundment Management (RIM) in east-coast impoundments and OMWM utilizing rotary ditches on both Florida's east and west coasts. These methods can result in greatly reduced mosquito populations with a minimal need for pesticide use.

**B. LARVICIDING.** Because of their target-specificity and safety to the environment, the FMCA will continue to stress to its members the importance of using "biorational" larvicides (*Bti*, *B. sphaericus* and insect growth regulators). However, because of the limited number of larvicides available for use, we anticipate that temephos (=Abate) will continue to be an important larvicide used in Florida.

**C. ADULTICIDING.** The FMCA will encourage its members to use the latest, scientifically proven techniques and equipment for both ground and aerial adulticiding and use chemical application rates that provide good control benefits. The FMCA will stress that all applications must be made only when the need truly exists as verified through adequate surveillance, and insist that equipment be properly calibrated. Accurate chemical applications using Global Positioning System (GPS) equipment will also be strongly encouraged.

Mosquito control offices will continue to be urged to carefully consider individuals' concerns over exposure to mosquito control chemicals. Mosquito control offices will be urged to take prudent steps to take these concerns into consideration. Under these circumstances, actions that mosquito control can attempt include: 1) prior notification before spraying their neighborhood so the individual can take precautions (such as closing their windows, going out for the evening), or 2) attempt to exclude treatment of their immediate residence (not always feasible when their neighbors may be demanding mosquito control services).

**D. RESEARCH.** The FMCA fully recognizes, and will continue to support, the importance of research in maintaining effective control programs. Toward that end, the FMCA's Research Advisory Committee is dedicated to making proper recommendations on what fields of research, and what specific projects, deserve priority funding (when funding is available). A recently approved project, with significant PESP implications of reducing pesticide use and risk in the future, is an in-depth, cooperative study of the effects of aerial chemical drift. The goals of this project are to try and fine-tune aerial adulticide application methods to minimize non-target effects.

**E. EDUCATION.** As stated in the AMCA's Strategy Document, the FMCA also recognizes that education is the key to meeting PESP goals. Toward that end, the FMCA will continue to support the Dodd Short Courses, as Florida's main organized forum for educating mosquito control workers. Also, *Wing Beats*, the Journal of the FMCA, and the Fall and Spring annual meetings of the FMCA will serve as mechanisms to keep mosquito control professionals trained and informed thus reducing future pesticide risk in Florida.

**VI. MEASURING PROGRESS IN MEETING PESP GOALS.** The FMCA will measure progress in meeting PESP goals by supporting, encouraging and carefully monitoring the initiatives listed in V. above and annually providing a detailed report on progress in meeting PESP goals and objectives within these areas. This process will be lead by Joseph Ruff who will serve as the FMCA's PESP Contact to the AMCA. Assistance will be solicited from various FMCA members around the State as needed.

**VII. SUMMARY.** The FMCA looks forward to participating as a "PESP Partner under the AMCA's auspices" in this program which we believe can have long-term benefits to both associations. The FMCA believes that our members' activities over the past 10-15 years have already accomplished many of the stated PESP goals and objectives and we view becoming a Partner as a natural extension of our member's ongoing endeavors. While significant progress has been made, there is continued room for improvement.

## **FMCA ORGANIZATIONAL DESCRIPTION**

**President:** The President maintains and exercises general supervision over the affairs of the Association, subject to authority by the Board of Directors.

**President Elect:** The President-Elect exercises the powers and performs the duties of the President in the absence or disability of the President, or in case of a vacancy in the office of the President, and serves as Program Chairman for the Fall Meeting of the Association. The President-Elect automatically becomes President the year following his term of office as President-Elect.

**Vice President:** The Vice-President exercises the powers and duties of the President-Elect in the absence or disability of the President-Elect and serves as program chairman for the Spring Meeting of the Association.

**Executive Director:** The Executive Director, which is a non-elected position, appointed by the Board of Directors, serves as the Association's business manager and is a non-voting member of the Board of Directors. Duties include keeping meeting minutes, sending out meeting notices, conducting correspondence, paying all bills and keeping financial records and performing such other duties as may be assigned by the Board of Directors.

**Immediate Past-President:** The Immediate Past President serves as a voting Board member and as chair of the Nominating Committee.

**Board of Directors:** The Board consists of the elected officers of the Association, the 4 Regional Representatives, a Member at Large and the Executive Director (who serves as a non-voting member). The President serves as Board Chairman. The Board of Directors manages the affairs of the Association, fills vacancies among the officers, prescribes duties of the officers not otherwise prescribed by the Bylaws, provides rules and regulations for the conduct of the Association's affairs and has full power in all matters demanding action between meetings.

## **FMCA COMMITTEES PERTINENT TO PESF**

**Education Coordination Committee (ECC):** This committee brings together all the projects and committees intended to provide training or information to the membership, or which deals with public relations. The ECC includes the Aerial Training Subcommittee, the Agency Profiles Subcommittee, the Buzz Words Newsletter Subcommittee and the Dodd Short Course Subcommittee. The purposes of the ECC are:

- 1) To develop and maintain programs to meet the educational and informational needs of both individual and sustaining FMCA members;
- 2) To coordinate the scheduling of mosquito control related educational courses, seminars, meetings, fly-ins and workshops sponsored by the varied interest groups within the FMCA, whether or not the event is approved or sponsored by the FMCA;
- 3) To keep FMCA members informed of the education products and services provided by the FMCA;
- 4) To consider requests for FMCA approval of non-FMCA sponsored educational events and items, such as short courses by other organizations;
- 5) To provide full or partial funding of educational events and items sponsored or co-sponsored by FMCA;
- 6) To consolidate under one committee the activities of the several former committees and ad hoc projects that provide educational materials;

7) To provide by virtue of a larger committee, greater member participation in the decision-making process related to expenditures for educational programs.

**Legislative Committee:** This committee keeps in touch with the FMCA's legal counsel to learn of pending new or modifying legislation which may affect mosquito control programs and reports to the FMCA Board of Directors.

**Research Advisory Committee:** This committee makes recommendations to the Board of Directors regarding the needs of Florida Mosquito Control programs which can be addressed through research.

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## Appendix 2

**FUND:** MOSQUITO CONTROL FUND

**DIVISION:** Mosquito Control & Stormwater Maintenance

**ACCOUNT NUMBER:** 122-216-562

**GROUP:** Public Works

**PROGRAM:** Mosquito Control

**MISSION STATEMENT:** To train and empower its employees to provide Leon County residents and visitors with effective and environmentally sound mosquito control and stormwater maintenance services. Services and educational programs are rendered to protect public health, the environment and provide for public safety and human comfort as well as to enhance the economy and promote a higher quality of life.

**PROGRAM DESCRIPTIONS:** The Mosquito Control Section of the Division provides a variety of abatement and educational services to reduce the level of mosquito populations and their threat to public health. Services include surveillance activities, truck and hand ULV (fogging) applications, ground and aerial larviciding applications, domestic mosquito inspections, as well as community and school education programs.

**TRENDS AND ISSUES:** West Nile Virus - It is anticipated by state health officials that this mosquito-borne disease will be established in Florida with the next year or two. Leon County will be fully involved in two critical areas in managing this disease. First, mosquito control staff will continue current citizen education programs regarding mosquito mitigation as several of the types of mosquitoes that transmit the disease are those that commonly breed in man-made containers. In order to better serve the community, there is a budget request to upgrade the .5 FTE, OPS Community/Health Educator position to a .5 FTE career service position. In conjunction with this upgrade, the Solid Waste Division is requesting a .5 FTE counterpart to this position to expand the recycling education program. Approval of these requests would make the position a full-time career service position. Second, the Division will participate in a statewide West Nile virus early detection surveillance program so disease abatement activities can be initiated as soon as necessary. In addition, Leon County Mosquito Control has been asked by the state to participate on a West Nile virus rapid response team to hone skills and better serve Leon County and our surrounding counties.

PERFORMANCE MEASUREMENTS:									
<i>Customer Focus, Satisfaction, &amp; Involvement</i>									
% of larviciding requests responded to within 2 working days.	ACTUAL FY 99/00	PROJECTED FY 00/01	PROJECTED FY 01/02	PROJECTED FY 02/03	PROJECTED FY 03/04	PROJECTED FY 04/05	PROJECTED FY 05/06		
	97%	80%	80%	80%	80%	80%	80%		
% of fogging requests responded to within 2 working days.	91%	80%	80%	80%	80%	80%	80%		
% of domestic mosquito control service requests responded to within 2 working days.	98%	80%	80%	80%	80%	80%	80%		
<i>Continuous Improvement</i>									
% of schools that are inspected for mosquito breeding micro habitats	N/A	100%	100%	100%	100%	100%	100%		
% of 4th grade classes provided with mosquito reduction education program	58%	70%	75%	75%	80%	80%	80%		
<i>Employee Well-being, Satisfaction, Education, &amp; Empowerment</i>									
Improve employee satisfaction level regarding open and effective communication	70%	85%	85%	85%	85%	85%	85%		

**PROGRAM EXPENDITURE/STAFFING SUMMARY**

FUND: MOSQUITO CONTROL

ACCOUNT NUMBER: 122-216-562

DIVISION: Mosquito Control and Stormwater Maintenance

PROGRAM: Mosquito Control

Object Code	Account Description	FY 99/00 Actual	FY 00/01 Adopted	FY 01/02 Requested			FY 01/02 Budget		
				NIT	Change	Total	NIT	Change	ARB
51200	Salaries & Wages	\$180,757	\$196,751	208,925	\$46,661	\$255,586	208,925	\$19,826	\$228,751
51300	Other Salaries								
51400	Overtime	185	1,000	1,000		1,000	1,000		1,000
52100	FICA Taxes	13,788	15,128	15,982	3,569	19,551	15,982	1,516	17,498
52200	Retirement Contributions	16,396	20,072	14,681	3,669	18,350	14,681	1,214	15,895
52300	Life & Health Insurance	15,016	21,058	23,473	7,448	30,921	23,473	3,724	27,197
52400	Workers Compensation	10,789	12,350	15,073	1,145	16,218	15,073	619	15,692
TOTAL PERSONAL SERVICES									
		\$236,931	\$266,359	\$279,134	\$62,492	\$341,626	\$279,134	\$26,899	\$306,033
53100	Professional Services								
53400	Other Contractual Services	10,345	16,500	12,750		12,750	12,750		12,750
54000	Travel & Per Diem	799	856	856		856	856		856
54100	Communication Services	1,354	1,000	1,250		1,250	1,250		1,250
54200	Postage	354	850	600		600	600		600
54300	Utility Services								
54400	Rentals & Leases	1,235	690	690		690	690		690
54500	Insurance	15,130	14,320	14,320		14,320	14,320		14,320
54600	Repair & Maintenance	1,085	1,900	1,500		1,500	1,500		1,500
54601	Vehicle Repair	16,002	18,715	16,821		16,821	16,821		16,821
54700	Printing & Binding								
54900	Other Current Charges	50	100				100		100
55100	Office Supplies	1,115	1,188	1,088		1,088	1,088		1,088
55200	Operating Supplies	112,322	109,495	112,237	(43,435)	68,802	112,137	(27,698)	84,439
55210	Fuel & Oil	7,501	10,688	10,500		10,500	10,500		10,500
55400	Books, Pub., Memberships	312	343	343		343	343		343
55401	Training								
TOTAL OPERATING EXPENSES									
		\$167,604	\$176,645	\$172,955	(\$43,435)	\$129,520	\$172,955	(\$27,698)	\$145,257
56400	Machinery & Equipment		3,000		3,000	3,000		3,000	3,000
TOTAL CAPITAL OUTLAY									
			\$3,000		\$3,000	\$3,000		\$3,000	\$3,000
PROGRAM TOTAL									
		\$404,535	\$446,004	\$452,089	\$22,057	\$474,146	\$452,089	\$2,201	\$454,290

**PROGRAM EXPENDITURE/STAFFING SUMMARY**

FUND: MOSQUITO CONTROL  
DIVISION: Mosquito Control and Stormwater Maintenance

ACCOUNT NUMBER: 122-216-562  
PROGRAM: Mosquito Control

STAFFING TABLE	FY 99/00 Actual	FY 00/01 Adopted	FY 01/02 Requested		FY 01/02 Budget		
			NIT	Change	Total	NIT	Change ARB
Mosquito Control Technician	2.00	2.00	2.00		2.00	2.00	2.00
Senior Mosquito Control Technician	1.00	1.00	1.00		1.00	1.00	1.00
Administrative Associate V	0.50	0.50	0.50		0.50	0.50	0.50
Mosquito Control & Strmwtr Maint Director	0.50	0.50	0.50		0.50	0.50	0.50
Mosquito Control Superintendent	1.00	1.00	1.00		1.00	1.00	1.00
Community Educator Position				0.50	0.50		0.50
Total	5.00	5.00	5.00	0.50	5.50	5.00	0.50 5.50

OPS STAFFING TABLE	FY 99/00 Actual	FY 00/01 Adopted	FY 01/02 Requested		FY 01/02 Budget		
			NIT	Change	Total	NIT	Change ARB
Mosquito Fogger	1.93	1.93	1.93		1.93	1.93	1.93
Administrative Associate I	0.50	0.50	0.50		0.50	0.50	0.50
Fogger Supervisor	0.35	0.35	0.35		0.35	0.35	0.35
Community Educator							
Mosquito Control Technician	1.00	1.00	1.00	0.65	1.65	1.00	0.65 1.65
Total	3.78	3.78	3.78	0.65	4.43	3.78	0.65 4.43

**ADOPTED/RECOMMENDED BUDGET (ARB):**

This program is recommended at the current service level including the following program changes:

- reallocation and reclassification of 0.5 Community Educator and 0.65 OPS Mosquito Control Technicians from the DEP-tire grant program (122-214) with no fiscal impact. This change will place all of the mosquito control personal service expenses in this program, which is not supported by state grant funds and move out operating expenses from this program in a like amount to the grant supported program (122-214).
- replacement of aged hand fogger machinery totalling \$3,000.

# FIVE YEAR PROGRAM EXPENDITURE/STAFFING SUMMARY

FUND: MOSQUITO CONTROL  
 DIVISION: Mosquito Control and Stormwater Maintenance  
 ACCOUNT NUMBER: 122-216-562  
 PROGRAM: Mosquito Control

Object Code	Account Description	BUDGET YEAR	PROJECTED									
			YEAR TWO		YEAR THREE		YEAR FOUR		YEAR FIVE			
			FY 01/02 ARB	FY 02/03 Change	FY 02/03 Plan	FY 03/04 Change	FY 03/04 Plan	FY 04/05 Change	FY 04/05 Plan	FY 05/06 Change	FY 05/06 Plan	
	TOTAL PERSONAL SERVICES	\$306,033		\$26,691	\$341,905		\$352,162	\$27,831	\$390,558		\$402,275	
	TOTAL OPERATING EXPENSES	\$145,257		\$19,543	\$164,800	\$6,000	\$170,800	\$7,560	\$178,360	\$1,000	\$179,360	
	TOTAL CAPITAL OUTLAY	\$3,000		\$2,200	\$5,200		\$5,200	\$2,200	\$7,400	\$7,000	\$14,400	
	PROGRAM TOTAL	\$454,290	\$48,434	\$511,905	\$6,000	\$528,162	\$37,591	\$576,318	\$8,000	\$596,035		
	TOTAL REGULAR STAFF	5.50		5.50	1.00	6.50		6.50			6.50	
	TOTAL OPS STAFF	4.43		4.43		4.43		4.43			4.43	
	TOTAL STAFFING	9.93		9.93	1.00	10.93		10.93			10.93	

## ADOPTED/RECOMMENDED BUDGET (ARB):

Requested program changes for the outyears include:

- 1.0 additional Mosquito Control Technician and Larviciding service level increase in FY 02/03
- new mosquito fish hatchery in FY 03/04
- 1.0 additional Mosquito Control Technician in FY 04/05
- new larviciding unit in FY 05/06

Attachment # 53 of 268

### **About the Author**

Renee Murray has a BS in Biochemistry and is receiving her MPA in December 2002. Ms. Murray is currently the Chemical Safety Coordinator at Florida State University. Her interest with chemical safety spans over twenty years. Ms. Murray believes that it is in the interest of everyone to be aware of the impact we have on our surroundings and respect the neighbors that share this earth with us.

# **Medical studies indicating health hazards from pyrethroid pesticides**

Links between pyrethroids and breast  
cancer

Links between insecticides and  
testosterone decreases

Links between pyrethroids and childhood  
brain cancers

Links between pyrethroids and  
neurological damage

Links between pyrethroids and thyroid  
damage

**[Click Here to Add Comment](#)**

**Subject: Medical studies indicating health hazards from pyrethroid pesticides**

**Date:** Thu, 16 Nov 2000 10:16:50 -0500

**From:** Stephen Tvedten

**<[steve@getipm.com](mailto:steve@getipm.com)>**

**Organization:** Get Set Inc.

**([www.getipm.com](http://www.getipm.com))**

**To:** Paul Helliker <[phelliker@cdpr.ca.gov](mailto:phelliker@cdpr.ca.gov)>

**Director, State of California,**

**Department of Pesticide Regulation**

**Dear Mr. Helliker, I thought you might like to read an article entitled: Medical studies indicating health hazards from pyrethroid pesticides.**

Sumithrin (Anvil), resmethrin (Scourge) and permethrin (often used in household bug sprays) each belong to a class of pesticides known as pyrethroids. Sumithrin and

resmethrin were not among the pyrethroids specifically studied in all medical studies reported on this page, but these pesticides are closely related to each other.

## **Links between pyrethroids and breast cancer**

Several studies indicate pyrethroids disrupt the endocrine system by mimicking the effects of the female hormone estrogen. This in turn can cause breast cancer in women and lowered sperm counts in men. When estrogen levels are elevated, old cells are not removed from the body and cell proliferation occurs, whether benign or malignant. Mount Sinai School of Medicine: This study examined four pyrethroid pesticides, including sumithrin. It concludes "Overall, our studies imply that each pyrethroid compound is unique in its ability to influence several cellular pathways. These findings suggest that pyrethroids should

be considered to be hormone disruptors, and their potential to affect endocrine function in humans and wildlife should be investigated." [Environmental Health Perspectives, vol. 107, no. 3, March 1999, pages 173-177.] The Roger Williams General Hospital, Brown University: This study on pyrethroids concludes "Chronic exposure of humans or animals to pesticides containing these compounds may result in disturbances in endocrine effects." [Journal of Steroid Biochemistry, March 1990, volume 35, issue 3-4, pages 409-414.] Cambridge University: A report issued in June 2000 by the Royal Society in England and written by a group from Cambridge University called for international cooperation to deal with the dangers posed by endocrine-disrupting chemicals, including pyrethroids, and recommends reducing human exposure to these chemicals.

## **Links between insecticides and testosterone decreases**

University of Greifswald: Several pesticides used as herbicides, insecticides and fungicides known to be endocrine disrupting chemicals were examined in this series of German studies. Acute and chronic pesticide exposure led to changes in sex hormone concentrations, with concentrations of testosterone decreasing one day after acute exposure. These studies found "a hormonal and immune suppression after acute exposure." ["Disruption of male sex hormones with regard to pesticides," Toxicology Letters, June 30, 1999;107(1-3): 225-31 ]

## **Links between pyrethroids and childhood brain cancers**

A study of pesticides and childhood brain cancers has revealed a strong relationship

between brain cancers and compounds used to kill fleas and ticks, according to a report published in Environmental Health Perspectives. The study concludes "The specific chemicals associated with children's brain cancers were pyrethrins and pyrethroids (which are synthetic pyrethrins, such as permethrin, tetramethrin, allethrin, resmethrin and fenvalerate) and chlorpyrifos (trade name: Dursban)." [Janice M. Pogoda and Susan Preston-Martin, "Household Pesticides and Risk of Pediatric Brain Tumors," Environmental Health Perspectives, vol. 105, no. 11 (November 1997), pages 1214-1220.] The EPA, in June 2000, halted sales of Dursban.

## **Links between pyrethroids and neurological damage**

Several studies have indicated neurological damage resulting from exposure to

pyrethroids, and some of the damages have been found to be long term. Ludwig Maximilians University: This study, conducted by the Physiological Institute at Ludwig Maximilians University in Munich, Germany, found that although "a majority of complaints following an acute pyrethroid intoxication disappeared after the end of exposure," several effects were still seen in patients after more than two years. Among these long-term symptoms were "(1) cerebro-organic disorders (reduced intellectual performance with 20%-30% reduction of endurance during mental work, personality disorder), visual disturbances, dysacusia, tinnitus; (2) sensomotor-polyneuropathy, most frequently in the lower legs; (3) vegetative nervous disorders," including increased heat-sensitivity and reduced exercise tolerance due to circulatory disorder. The study concludes "Many of these patients exhibit pathological autoimmune diagnostical findings and

developed autoimmune diseases." [Toxicology Letters, 1999 June 30;107(1-3):161-76.]

Uppsala University: This study, conducted by the Department of Environmental Toxicology at Uppsala University in Sweden studied mice, not humans, but found that "low-dose exposure" to pyrethroids "resulted in irreversible changes in adult brain function in the mouse" when exposed during the growth period. This occurred at levels of exposure less than what was found to affect adult mice. The study also found "neonatal exposure to a low dose of a neurotoxic agent can lead to an increased susceptibility in adults to an agent having a similar neurotoxic action, resulting in additional behavioral disturbances and learning disabilities." [Neurotoxicology, 1997;18(3):719-26.] Northwestern University Medical School: A series of investigations conducted at Northwestern's Department of Molecular Pharmacology and Biological Chemistry in Chicago, has found neurological

damage from pyrethroids. One study, conducted by international expert Toshio Narahashi, finds nervous-system damage from pyrethroids to be comparable to DDT. This study found that "Detailed voltage clamp and patch clamp analyses have revealed that pyrethroids and DDT modify the sodium channel to remain open for an extended period of time." The result of this damage is "potent effects on the nervous system." ["Nerve membrane ion channels as the target site of environmental toxicants," Environmental Health Perspectives, 1987 April; 71:25-9.]. A separate study found that pyrethroids cause "membrane depolarization, repetitive discharges and synaptic disturbances leading to hyperexcitatory symptoms of poisoning in animals." This study found that only 1% "of sodium channel population is required to be modified by pyrethroids to produce severe hyperexcitatory symptoms." ["Neuronal ion channels as the target sites of insecticides,"

Pharmacol Toxicology, 1996 July;79(1):1-14.]

## **Links between pyrethroids and thyroid damage**

A study conducted by four scientists on a variety of pesticides found a connection to thyroid damage, although this study was conducted on rats and not on humans. The study concludes "exposure to organochlorine, organophosphorus, and pyrethroid insecticides for a relatively short time can suppress thyroid secretory activity in young adult rats." The study also said a decrease in body weight seen "suggests that pyrethroid insecticides can inhibit growth rate." [Journal of Applied Toxicology, vol. 16, no. 5, pages 397-400, 26 references, 1996.]

No Spray Coalition Inc.

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The No Spray Coalition is the lead plaintiff in a lawsuit filed in federal court against the City of New York seeking a permanent halt to mass pesticide spraying. For more information, please email us at:

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**Well Mr. Helliker, I am sure that there will be more lawsuits directed against the continued use of your "registered" POISONS. When will it be "legal" (in your opinion) to use safe and far more effective (unregistered) alternatives to actually control pest problems in the state of California?**

Respectfully, Stephen L. Tvedten

## **AN OPEN LETTER**

from

Concerned Physicians and Scientists

# **RETHINKING WEST NILE VIRUS**

February 2004

- **Softening of diagnostic laboratory criteria – a cause of “dramatic increase” of West Nile virus (WNV) encephalitis and an emergence of WN virus Neurological Manifestations (WNNM)**
  - **Why pesticide spraying *increases* the risk of WNV encephalitis**
  - **Why to avoid DEET**
  - **“Natural immunization” - i.e., according to emerging data, a healthy immune system and being bitten by a mosquito carrying a sufficient amount of WNV provides the best protection against WNV encephalitis**
  - **Pollution and WNV**
-

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# RETHINKING WEST NILE VIRUS

## AN OPEN LETTER

from

Concerned Physicians and Scientists

February 2004

We, the undersigned physicians and scientists, have a particular interest in the impact of West Nile virus (WNV) and synthetic chemical pesticides on human health.

We are greatly concerned about the issues listed below as well as some additional common misconceptions, mainly caused by a lack of a full understanding of certain WNV issues. There is a lack of awareness on the part of the media and the public, as well as among most physicians, scientists, and other health professionals that

- the unexpected **“dramatic increase” of WNV encephalitis** since the year 2002 is **not caused by a spread of WNV, but by a softening of WNV diagnostic laboratory criteria** (Appendix 1)
- this **diagnostic softening** is also a **cause** for the emergence of “new clinical pictures”, so called **WN virus Neurological Manifestations (WNNM)**<sup>1</sup>
- those who are **most negatively affected by pesticide spraying** are small children, pregnant women, those with weakened immune systems (patients with cancer, AIDS, etc) and the elderly<sup>2</sup> – **the same population segments we want to protect** against the WNV encephalitis
- synthetic chemical **pesticides** are deliberately **made poisonous to kill** or slowly destroy unwanted forms of life
- because **we share the basic life blueprint** with other forms of life\*, it is impossible to achieve target selectivity and therefore we are also vulnerable to the toxic impacts of pesticides<sup>3</sup> (Appendix 2)
- **pesticides have cumulative multigenerational destructive and degenerative impacts** on human health, especially on the development of children,<sup>2-4\*</sup>. The health damage may not be evident immediately, it may appear years or even decades later
- there is a **connection between pollution and WNV incidence**. (Appendix 4)

\*Our human cells - the structural building units of living forms, and our main metabolic processes, are basically the same for all living organisms. Although the appearances of various cells are widely different, they have the same basic features as in other life forms. Every cell is surrounded by a membrane, the cell wall, and contains a nucleus with chromosomes in the form of DNA (apart from red cells), nucleolus, cytoplasm and additional specialised structures such as mitochondria for energy generation, etc. The biochemical similarity is such that medications and pesticides are tested on animals or bacteria and the results are applied to humans.

Millions of dollars have been spent in "the battle with the West Nile virus." In Ontario alone, one hundred million dollars has already been allocated for the next five years; an additional nine million dollars was given for the year 2003.

The decision to budget millions of dollars to "prevent WNV encephalitis and WNNM" appears to be triggered by a number of factors including:

- the **fear** that, as the West Nile virus became more entrenched, it would spread around the country, with each year bringing more cases than the previous one
- the **lack of awareness** that the so called "**unexpected dramatic spread**" of **WNV encephalitis**, as well as an emergence of WN virus Neurological Manifestations (**WNNM**), are the **results of omitting an original confirmatory test to document that WNV penetrated through the blood-brain barrier into the central nervous system**
- the retroactive softening of diagnostic criteria allows an **amalgamation of West Nile virus encephalitis with other types of viral encephalitis** where the WNV is only an incidental finding, not a cause, of the encephalitis
- a widespread belief that modern synthetic pesticides are safe because "otherwise they wouldn't have been approved by government authorities", without consideration of other methods that might be equally effective, or even better, and not harmful to the public's health
- an ongoing **lack of information**, both in the mainstream medical literature, as well as among a majority of physicians and other health professionals, regarding the serious **health impacts** of synthetic chemical **pesticides** - especially their impacts on the physical and mental development of children, and on those with weakened immune systems<sup>4</sup>
- viewing the **pesticide issue** as a **political battle** between environmental groups and pro-pesticides stakeholders, rather than recognising that pesticide exposure is a seriously underestimated widespread public health problem, potentially affecting everyone, including decision makers and their families<sup>2,5</sup>
- the impact of the recent SARS scare
- the notion that "we have to be ready for a battle with WNV"
- a recollection of the widely publicised drastic measures implemented to suppress foot and mouth disease
- a class-action lawsuit by a group of **citizens**<sup>6</sup> **suing the Ontario government for "failing to protect them against WNV encephalitis"**
- pressure on the government for a "quick fix" solution
- the notion that pesticide use is a "proactive response".

There are some additional important misconceptions we would like to address.

## Misconception # 1

### Fact

*WNV is a dangerous virus. It causes a deadly disease through a mosquito bite. Everyone is at risk.*

**Not true. WNV virus is almost never dangerous. It may only become dangerous if it penetrates through the blood-brain barrier into the central nervous system.**

### WNV transmission

The Centres for Disease Control and Prevention (CDC) state<sup>7</sup> that only about one in 1000 mosquitoes carry the WNV infection.

WNV is transmitted by the bite of a female **mosquito** infected by WNV.

**WNV IS NOT TRANSMITTED DIRECTLY FROM ONE PERSON TO ANOTHER.**

WNV may become transmitted only *indirectly* from a person with an active WNV infection by **blood transfusion** and/or **organ transplant**.

### Response to WNV exposure

The response to WNV exposure depends on the **strength of the immune system** and the permeability of the **blood-brain barrier**.<sup>8</sup>

#### 1. *WNV encephalitis/meningitis*

About one in 150 people bitten by a *WNV infected* mosquito will develop neurological problems, usually an infection of the brain (encephalitis) or meningitis<sup>9</sup> (Inflammation of the lining of the brain or spinal cord). Almost all of those affected by WNV encephalitis are *elderly with suppressed immune systems and/or increased blood-brain barrier permeability*.<sup>10</sup> These conditions can be fatal.

#### 2. *WNV fever*

Those who have immune systems that are weakened but not suppressed may develop **WNV fever**.

About 13% of those bitten by an infected mosquito will develop West Nile fever with headaches and flu-like symptoms, from which they eventually recover.<sup>11</sup>

### 3. **Asymptomatic Response**

A positive blood test for WNV appears in many completely healthy individuals who were randomly tested for WNV.

Thousands of people were found to have WNV antibodies proving they were bitten by a mosquito carrying WNV. However, they did not develop any signs of infection because their immune systems were healthy. They were not even aware that they were exposed to the virus.<sup>12</sup>

There is a general agreement among experts that an infected person becomes immune to the WNV, usually for life.<sup>14</sup>

#### **Misconception #2**

##### **Fact**

*There is an unexpected rapidly growing incidence of WNV encephalitis. Additionally, there is an emergence of new WNV related clinical pictures – the so called WN virus Neurological Manifestations (WNNM).*

**Not true. The cause of the “unexpected growing incidence of WNV encephalitis” is a retroactive softening of laboratory diagnostic criteria for WNV encephalitis.**

**The current laboratory diagnostic criteria are incorrect because they omit the *original* confirmatory test used in the original diagnostic criteria to document that WNV penetrated into the brain and caused encephalitis and/or meningitis.**

**In other words, a test confirming that WNV *penetrated* the blood-brain barrier, and *is* a cause of the WNV encephalitis or meningitis, is not required anymore. (Appendix 1)**

The retroactive softening of laboratory diagnostic criteria leads to an amalgamation of encephalitis cases due to WNV with those cases of encephalitis caused by other viruses where WNV positivity is a coincidental finding reflecting a past WNV exposure. This approach leads to a false impression that the number of WNV encephalitis/meningitis cases is markedly increasing.

The softening of laboratory diagnostic criteria is also responsible for an emergence of so called West Nile virus Neurological Manifestations (WNNM). (Appendices 1,8)

#### **Misconception # 3**

*Precautions are necessary to protect oneself, and especially children, against a mosquito bite. The mosquito repellent* **16**

should contain DEET – the active substance.

## Fact

Not true. DEET can be potentially harmful. The American Medical Association reported<sup>15</sup> three cases of death in children resulting from their exposure to DEET. There are also reports of serious consequences after exposure to DEET in adults, even death. (Appendix 2)

As mentioned previously, there is a general agreement among experts that **the best protection** against WNV encephalitis is to be **bitten by a mosquito infected by WNV**. This should happen **while** the **immune system** of such an individual (child or adult) is still normal. Such individuals will usually develop life-long **immunity to the WNV**.

## Misconception # 4

*A positive WNV test means that a person's health problems are caused by the WN virus infection.*

## Fact

Not true. A positive WNV test does not mean that the health problems of that person are caused by WNV. It may be only a coincidental finding reflecting a past exposure to WNV. (Appendices 1,8)

## Misconception # 5

*Pesticide spraying effectively reduces the number of mosquitoes.*

## Fact

Not true. Pesticide spraying does not *ultimately* reduce the number of mosquitoes but actually *increases* their population. Initially, pesticide spraying reduces the number of mosquitoes for about 2-3 days, but after 1-2 weeks their number starts to grow steadily. The surviving mosquitoes are mainly those which became resistant to the pesticides being used.<sup>16</sup> (Tables 3a, 3b)

## Misconception # 6

*Exposure to pesticide spraying does not cause any serious health damage*

### Fact

**Not true. Exposure to the pesticide spraying may actually increase the risk of developing WNV encephalitis because it weakens the immune system.<sup>3</sup> It may also cause a myriad of other health problems, many of them serious.<sup>4,5</sup>**

The World Resources Institute report entitled, "Pesticides and the Immune System, The Public Health Risks"<sup>3</sup> presents scientific evidence that pesticide-related health problems are much more serious than generally acknowledged. The report concludes that one of the gravest and most underestimated dangers of pesticides is the weakening of the immune systems of animals and humans. The weakening of the immune system leads to a risk of developing and succumbing to infections to which one might be otherwise resistant. It may also increase the risk of developing cancer.<sup>5</sup>

### Repeated pesticide spraying

- markedly **reduces** the number of **mosquito predators** (birds, fish, frogs, dragonflies etc.) because they are more affected by pesticides than mosquitoes

In 2001, in New York City, autopsies of 80,000 birds were carried out to identify the cause(s) of their deaths. The autopsies revealed that the major reason for their deaths was exposure to commonly used synthetic chemical pesticides.<sup>17</sup>

- ultimately leads to a dramatic and steadily increasing **growth of the mosquito population** because of the reduction in the number of mosquito predators
- leads to a survival of mosquitoes which became resistant to the pesticides used for spraying.

### The surviving mosquitoes

- are more **aggressive** (more biting)
- make WNV **transmission easier** due to an increased permeability of mosquito body tissues to the WNV
- are gradually more and more resistant to the pesticides which were used; this leads to a need to apply more and more potent (i.e. more and more toxic) pesticides each year, the so called "**pesticide treadmill**".

16

The Cicero swamp study in New York State is an example of how pesticide spraying, especially if repeated, leads to a

growth of the WNV carrying mosquito population. After eleven years of pesticide spraying the mosquito population had grown 15 fold<sup>18</sup>.

Another example of the consequences of mosquito spraying can be seen in the city of Winnipeg. With repeated, multiple annual pesticide spraying, Winnipeg has become the most mosquito infested city not only in the province of Manitoba but in all of Canada.

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**Misconception # 7**

*The concentration of pesticides in our environment is usually measured in parts per million (ppm) and in parts per billion (ppb). These ppm and ppb concentrations are extremely low and therefore may be considered negligible in terms of the health risk they pose.*

**Fact**

**Not true. Even such extremely low and seemingly insignificant amounts of pesticide residues, measured in parts per million (ppm) and parts per billion (ppb), may present a serious risk to human health.**

These extremely low concentrations have been frequently compared to units of money (1 ppm = 1 cent in \$10,000 or 1 ppb = 1 cent in \$10,000,000), to units of time, number of drops of water in an olympic-sized swimming pool, etc. Based on these comparisons, ppm and ppb concentrations have been generally considered to be so low as to be negligible and, therefore, to present no health risk.

However, when these "negligible" concentrations are compared to commonly prescribed medications and their concentrations in human tissues, it becomes obvious that even such extremely low concentrations do play an important role in human health/diseases. (Appendix 3)

Misconception # 8

DEET

Misconception # 9

Fact

*Pesticides are approved by government and therefore are safe.*

**Not true. The approval of pesticides by government does not mean that they are safe to human health. The exposure to synthetic chemical pesticide spraying poses a much more serious danger than the West Nile virus itself<sup>2-4</sup>.**

As mentioned previously, because we share the same basic Life-blueprint with other forms of life, the synthetic chemical pesticides are also poisonous to us. They are also poisonous to pets.

As Dr. E. Angelopoulos, retired Professor of Biology at Dalhousie University, states, ***"The basic major difference is our size. Therefore, synthetic chemical pesticides would not destroy us as rapidly as they would destroy, for example, mosquitoes or birds."***

**The US Environmental Protection Agency (EPA) agrees that no synthetic chemical pesticide can be considered safe. Ref.**

**Also, the New York State Department of Health acknowledges that the use of chemical pesticides has an inherent risk. Ref.**

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**APPENDIX 1**

## A Connection between WNV Encephalitis, WNV Neurological Illnesses, and a Retroactive Softening of WNV Encephalitis Laboratory Diagnostic Criteria

Encephalitis/meningitis due to WNV cannot be clinically distinguished from other viral causes of encephalitis/meningitis and therefore must be determined through a laboratory assessment. Originally, three different laboratory tests were required to confirm that encephalitis *is* caused by WNV:

Table 1a

WNV Encephalitis – Original Diagnostic Laboratory Criteria	
<b>1) <u>Screening test</u></b>	
<i>Significance</i>	Exposure to WNV “Natural vaccination” – usually life-long WNV immunity *after being bitten by a mosquito carrying sufficient amount of WNV <sup>13,14</sup>
<i>Clinical symptoms</i>	None
<b>2) <u>Probability test</u></b>	
<i>Significance</i>	Exposure to WNV in those whose immune systems at the time of exposure were weakened
<i>Clinical symptoms</i>	Usually fever with headaches and flu-like symptoms
<b>3) <u>Confirmatory test</u></b>	
<i>Significance</i>	Exposure to WNV Severely compromised immune system. This test confirms that WNV penetrated the blood- brain barrier and that the neurological symptoms (encephalitis/meningitis) are caused by WNV
<i>Clinical symptoms</i>	Clinical symptoms of encephalitis and/or meningitis

The above diagnostic approach was retroactively changed in the early part of the year of 2003 so as to omit the requirement to document the penetration of WNV into the central nervous system.

The explanation for this change was to “accelerate the diagnosis of the WNV encephalitis” and “to follow the U.S.A. laboratory diagnostic criteria for WNV.” (In the U.S.A. an original requirement to perform the confirmatory test documenting a penetration of the WNV across the blood-brain barrier is no longer mandatory).

As a result of this change in laboratory diagnostic criteria, all of the patients who contracted other types of viral encephalitis (eg. St. Louis encephalitis) and who have a positive probability test (i.e. IgM Elisa positive), because they were bitten in the past by a mosquito carrying WNV, are now classified as having WNV encephalitis. In other words, this new approach does not differentiate between those who have encephalitis due to WNV or due to other viruses along with WNV positively.

Two caveats must be considered when interpreting serologic tests. First, because of close antigenic relationships among the flaviviruses, persons recently vaccinated with yellow fever or Japanese encephalitis vaccines or persons recently infected with a related flavivirus (for example, St. Louis encephalitis or dengue) may have positive results on IgM antibody tests for West Nile virus.

Second, because most infected persons are asymptomatic and because IgM antibody may persist for 6 months or longer, residents in endemic areas may have persistent IgM antibody from a previous infection that is unrelated to their current clinical illness. An increase in West Nile virus-specific neutralizing antibody titer in serum specimens from persons with acute and convalescent disease confirms acute infection.

According to Dr. Michael Gochfeld, an expert in West Nile virus, WNV encephalitis accounted for only 5% of the deaths due to viral encephalitis in the New York -Connecticut/New Jersey area in the year 2000.

**The omitting of the requirement for the original confirmatory test leads also to an emergence of a "new clinical picture" – WN virus Neurological Manifestations (WNNM).**

Dr. Colin D'Cunha, who was at that time Ontario's chief medical officer of health, said in a W-Five television interview (files from Elaine Carey): "I accept that the diagnosis is a changing one and the science is changing but there has to be an element of national and provincial consistency."

The Canadian national definition was not yet established even in February 2003 as it is obvious from the letter by Dr. D'Cunha to Ontario physicians on human surveillance of WNV illness, ***"Note that at the time of mailing, (February 2003) the national case definition had not been finalized. Updated versions will be made available on the Ministry of Health and Long-Term Care web-site"***.

In his discussion on West Nile virus, Dr. David Goodfriend, Director of the Loudoun County Health Department, when online, was asked what the reason was for a discrepancy between the number of cases listed on the various state health department web sites and the number of cases listed for those states on the CDC site. His answer was that, apart from other reasons, it may be due to the fact that the state and the CDC may be using different definitions of what constitutes a West Nile virus case.

## WNV Encephalitis - Present Diagnostic Criteria (2003)

	Category	Clinical Symptoms	Required Specimen(s)	Lab Criteria
WNV Asymptomatic infections	1. Probable	no	serum	(s) IgM ELISA + -
	2. Confirmed	no	serum	(s) IgM ELISA +
WNV Fever	1. Suspect	yes	serum	pending
	2. Possible	yes	serum	(s) IgM ELISA+ -
	3. Probable	yes	serum	(s) IgM ELISA +
	4. Confirmed	yes	serum	(s) IgM ELISA + and PRNT confirmation*
WNV Neurological Manifestations (including WNV encephalitis)	1. Suspect	yes	serum	pending
	2. Possible	yes	or CSF	(s) IgM ELISA + -
	3. Probable	yes	fluid	(s) IgM ELISA +
	4. Confirmed	yes	or brain biopsy	(s) IgM ELISA + and PRNT confirmation*

\*Note: After five cases have been confirmed by PRNT (plaque reduction neutralisation test) in a health unit area, cases meeting the Probable Laboratory Criteria will be classified as Confirmed cases. PRNT is the most specific test for distinguishing arthropod-borne flaviviruses, although some degree of cross-reaction in neutralizing antibody may still appear. However serum PRNT does not determine if WNV virus penetrated into the brain or not.

(s) IgM ELISA + - = serum IgM ELISA indeterminate

(s) IgM ELISA + = serum IgM ELISA positive

### ENTER NARMC

In their review article titled "West Nile Virus results.: A Primer for the Clinician" Petersen and Marfine from CDC (Table 1c) write: "Among the patients in New York City who were infected in 1999 and 2000 and for whom a sample of cerebrospinal fluid was available, nearly all (95%) had demonstrable IgM antibody. Since IgM antibody does not cross the blood-brain barrier, IgM antibody in cerebrospinal fluid strongly suggests central nervous system infection".

## WNV Encephalitis – U.S. National Laboratory Diagnostic Criteria (August 2002)

From: Petersen, L.R., and Marfin A.A., West Nile Virus: A Primer for the Clinician Annals of Internal Medicine (6 August 2002) Vol. 137, Number 3, E-177 (CDC)

### I. A Possible case of West Nile encephalitis

*Febrile illness with neurologic syndrome* (ranging from headache to serious neurologic illness e.g. aseptic meningitis, myelitis, encephalitis)

Suggested specimens (if indicated) for West Nile virus diagnostic studies are the following:

- **Acute serum sample** (collect within 7 days of illness onset)
- **Acute CSF sample** (collect within 7 days of illness onset)
- **Convalescent serum sample** (collect 14-21 days after illness onset)

### II. A Probable case of West Nile encephalitis

*Febrile illness with neurologic syndrome plus at least one of the following:*

- Demonstration of **West Nile virus IgM antibody** in acute serum sample using MAC-ELISA
- Demonstration of elevated titer of West Nile virus-specific IgG (by ELISA) or HI antibody in a convalescent serum sample relative to titer in an acute serum sample (confirmed by PRNT)

### III. A Confirmed case of West Nile encephalitis

*Febrile illness with neurologic manifestations plus at least one of the following:*

- Isolation of **West Nile virus** from tissue, blood, CSF or other body fluid
- Demonstration of **West Nile viral antigen or genomic sequences** in tissue, blood, CSF, or other body fluid
- Demonstration of **West Nile virus IgM antibody** in an acute CSF sample using MAC-ELISA
- Demonstration of fourfold change in **PRNT antibody titer** to West Nile virus in paired, appropriately timed, acute and convalescent serum samples
- Demonstration of **both West Nile virus-specific IgM** (by MAC-ELISA) and **IgG** (by IgG ELISA or HI antibody titer; confirmed by PRNT) in a single serum

CSF = cerebrospinal fluid; EIA = enzyme immunoassay; HI = hemagglutination inhibition; PRNT= plaque reduction neutralization test; MAC-ELISA = IgM antibody-capture enzyme-linked immunosorbent assay

The clinical picture of encephalitis can result from a number of infections as well as non-infectious causes. The viral encephalitis in North America is usually caused by arboviruses. Arboviruses are a large group of viruses that are spread most commonly by blood sucking insects such as mosquitoes and ticks. A subgroup of arboviruses causing viral encephalitis are called flaviviruses. The most common flaviviruses in North America acting as the causes of viral encephalitis are St. Louis encephalitis, Eastern equine encephalitis, Western equine encephalitis and also recently West Nile encephalitis.

As mentioned previously, according to Dr. Michael Gochfeld, an expert in West Nile virus, WNV encephalitis accounted for only 5 % of the deaths due to viral encephalitis in the New York – Connecticut/New Jersey area in the year 2000.

In spite of the diversity of specific viral etiologies, the clinical manifestations of viral encephalitis are very similar. For this reason, it is necessary to use laboratory diagnostic tests to identify the exact etiology. PRNT (plaque reduction neutralization test) is the most specific test for distinguishing serologic cross-reactions among the flaviviruses. However, a **positive PRNT test does not mean that the viral encephalitis is caused by West Nile virus.**

## APPENDIX 3

### || Pesticide ppm and ppb Residues – an Inescapable Exposure

The commonly used method of expressing concentration is by stating the percentage, i.e., the number of parts of the given substance in the weight of 100 parts (100 percent), or in number of parts, for example parts per million (ppm), or per billion (ppb) of the stated matter.

The concentrations of pesticides and other chemical residues in our food and drinking water are usually expressed in parts per million (ppm) or parts per billion (ppb). Such concentrations have been frequently compared to money -- (1 ppm = 1¢ in \$10,000; 1 ppb = 1¢ in \$10,000,000), time, number of drops of water in an olympic pool, etc. Based on this comparison, ppm and ppb amounts have been considered by many to be infinitesimally low and therefore negligible, within tolerable limits, and without any health risk.

***The significance of ppm and ppb concentrations becomes more evident when these concentrations are expressed as weight units of commonly prescribed medications and in the concentrations of such medications in human body tissues.***

Pharmaceutical medications are usually prescribed in milligram quantities. One milligram of prescribed medication can be expressed as a concentration of 1 part per million (ppm) of body weight.

1 ppm = 1 part per million = 1milligram(mg) in 1 kilogram(kg)

1 kilogram (kg) = 1000 grams (gs) = 1,000,000 milligrams (mgs)  
1 milligram (mg) = 1 part per million (ppm) in 1 kilogram (kg)

1 ppb = 1 part per billion = 1 microgram (mcg) in 1 ppb

1,000,000 milligrams (mgs) = 1,000,000,000 micrograms (mcgs)  
1 microgram (mcg) = 1 part per billion (ppb) in 1 kilogram (kg)

- **Valium**, a widely used tranquilizer, is prescribed in milligram doses, most commonly a 5 mg tablet. If prescribed for a person whose weight is 100 kilograms (i.e. 220 pounds), the body tissue concentration will be 0.05 mg/1kg of body weight. This can be expressed as a Valium concentration 0.05 ppm;
- **Ativan**, another widely used tranquilizer, is usually prescribed in 1 mg doses representing **0.01 ppm**/1kg of body weight in a 100 kg person;
- **vitamin B12**, necessary for the proper formation of red blood cells, cell production, normal growth, and nucleoprotein and myelin synthesis, is needed in microgram doses. The required daily allowance (RDA) **for adults** is 2 mcgs. For a person weighing 100 kgs, this is approximately a tissue concentration of **0.02 ppb** per 1 kg of body weight.

### **The ability of DDT and other pesticide concentrations to cause animal tissues damage**

In animal experiments DDT, in concentrations of 3 ppm inhibits an essential enzyme in the heart muscle and 5 ppm causes necrosis or disintegration of liver cells; 2.5 ppm of the closely related chemicals, dieldrin and chlordane, causes the same damage.

**These few examples clearly confirm that even such infinitesimal concentrations as parts per million (ppm) or parts per billion (ppb) can play an important role in human health/disease. Therefore we cannot ignore the dangers posed by synthetic chemical pesticide residues, even such seemingly innocent commonly used substances as weed**

killers or other chemical pesticides may cause a serious impact on human health, especially the health of children and pregnant women.

There may be no protection to be had by staying indoors during pesticide spraying.

For example, in one instance studied, it was observed that 5-6 hours after spraying began, indoor concentrations of pesticide residues exceeded those existing outdoors, with an average concentration of 244 CGU/m<sup>3</sup> vs. 77CFU/m<sup>3</sup> outdoors. This suggests that the initial benefits of remaining indoors during spraying may not persist as outside air moves indoors with normal daily activities.

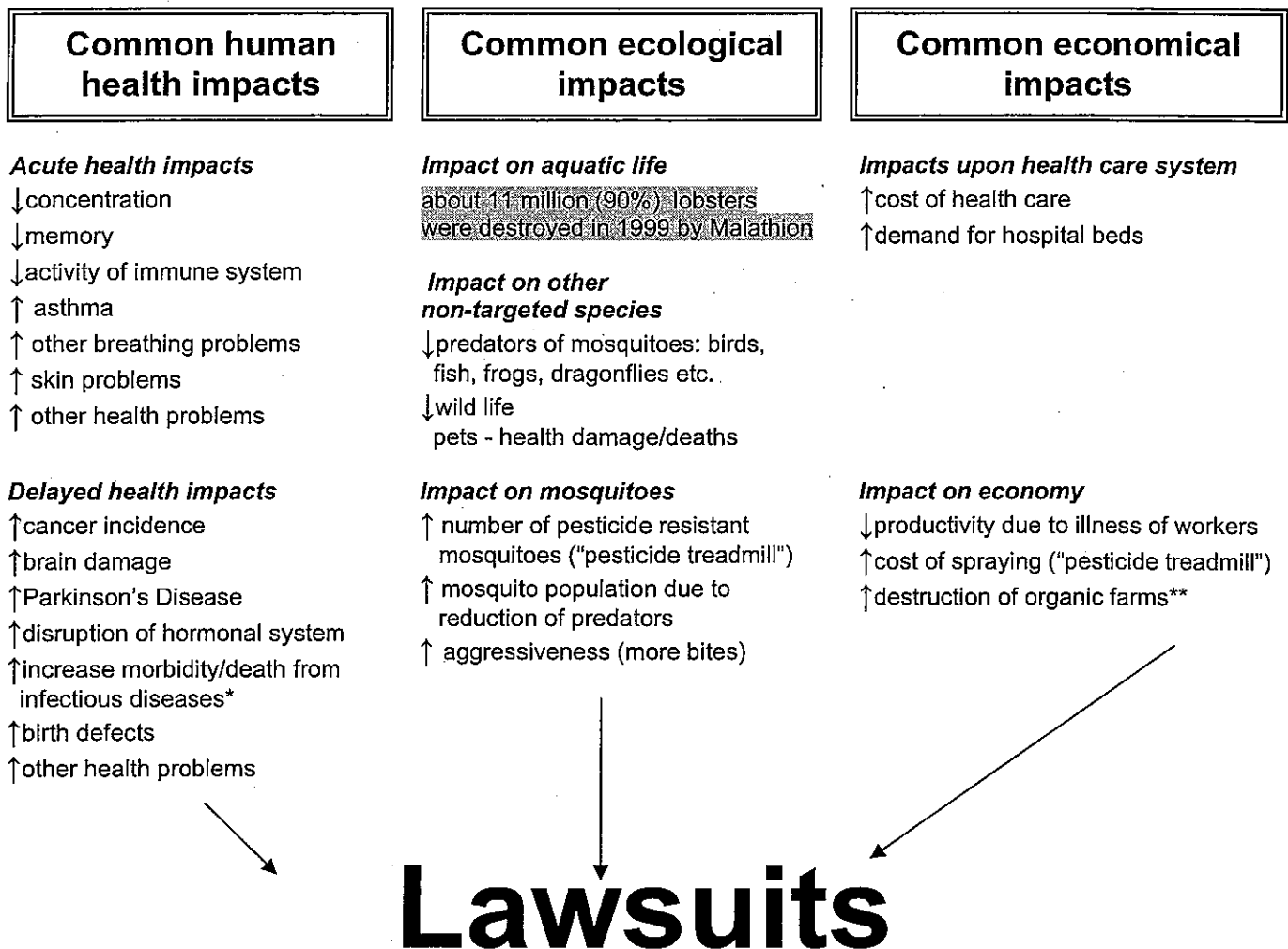
Brain-blood barrier (BBB), pesticides, stress and viral invasion:

It was documented that the developing BBB was highly vulnerable to the exposure to certain pesticides. Even, sometimes, to a single exposure. The observed impact of pesticide exposure during brain development is permanent and may produce some neurological dysfunction in later life as well.

(Gupta A, Agarwal R, Shukla GS. Functional impairment of blood-brain barrier following pesticide exposure during early development in rats.- Hum. Exp. Toxicol 1999, Mar; 18(3): 174-9)

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## Impacts of Pesticide Exposure

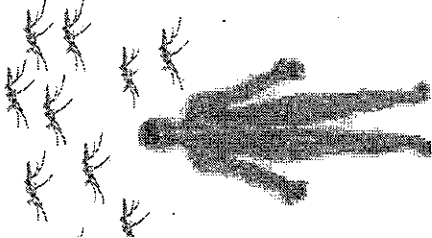
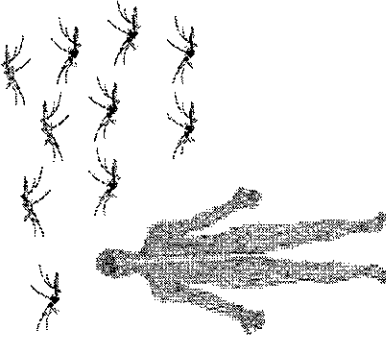
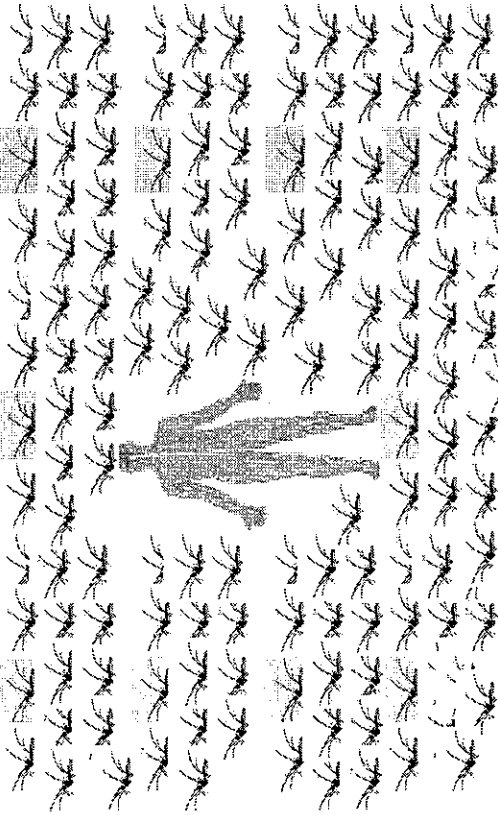


**The problems of today were the solutions of yesterday**

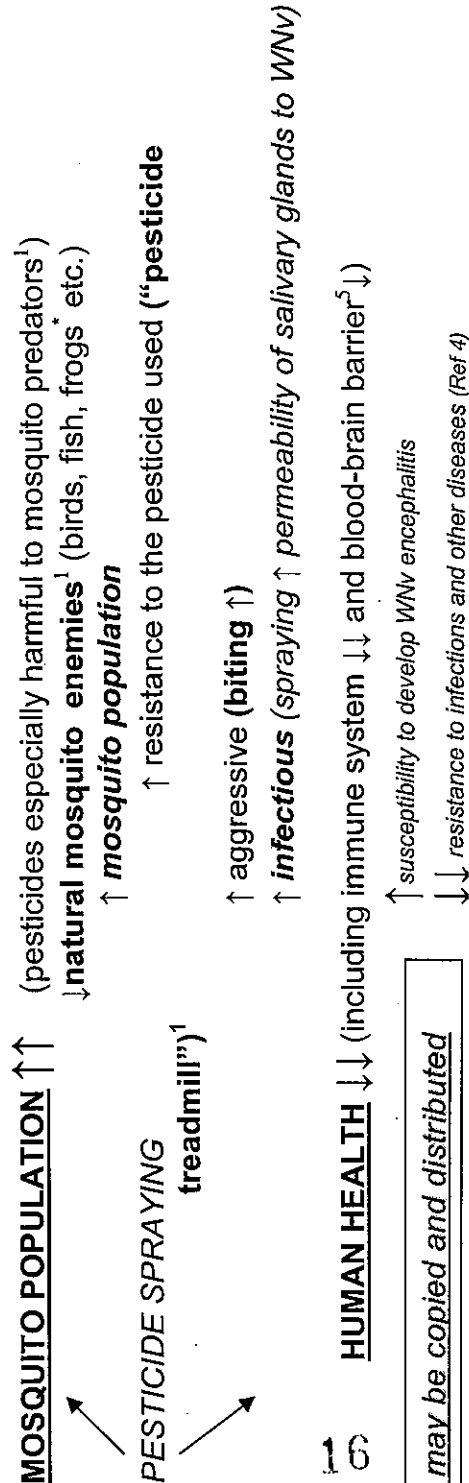
\* due to a weakening of the immune system

\*\* due to an inability to control the spread of pesticides once they are released into the environment

# BLE 3 IMPACT OF REPEATED PESTICIDE SPRAYING ON HUMANS AND MOSQUITOES

FORE ESTICIDE SPRAYING	AFTER PESTICIDE SPRAYING - Based on "Cicero" study (Ref 1)	
<p><b>First 2-3 days</b> after spraying number of mosquitoes may drop by 80%<sup>1</sup></p> 	<p><b>In 1-2 weeks</b> mosquito population back to original number<sup>1</sup></p> 	<p><b>After 11 years</b> of pesticide spraying, mosquito population has increased 15 fold - "Cicero" study<sup>1</sup></p>  <p>Fading of the human figure represents weakening of the immune system; darkening of mosquitoes represents their growing pesticide resistance and increasing aggression (biting)</p>

## WHY PESTICIDE SPRAYING IS ULTIMATELY COUNTERPRODUCTIVE



terial may be copied and distributed

**References**

- Oliver H JJ: Impact of nales (dibrom 14) on the mosquito vectors of eastern equine encephalitis virus. (The Cicero Swamp Study), J Am Mosq. Control, Dec;13(4):315-25,1997
- Gupta A, et al. Functional impairment of blood-brain barrier

## APPENDIX 4

## **The Connection between Pollution and West Nile Virus Incidence**

Jim West, a researcher with the No Spray Coalition, based in New York City (the supposed beachhead of the virus in North America) found a strong correlation between petrochemical emissions and both bird and human disease. For example, half the dead birds collected in the New York State counties with severe air pollution tested positive, while less than 5 % of those in moderately polluted counties and 0% in the least polluted counties tested positive. Excessive bird deaths were first noticed during a June 1999 air pollution peak in New York City and human illnesses and deaths started during a second, even worse, peak in late August. (West)

In Canada, Health Canada statistics for 2002 indicate a similar environmental connection. In Quebec, 2% of dead birds found in the most rural areas of the province tested positive, but 37% of those which tested positive were from the urban areas of Montreal/Laval. In Ontario, about 5-11% of birds in rural areas were found to be positive (e.g. 5.6% in the Porcupine district) but from 15-75% in the more industrialised areas (e.g. 35% in Toronto).

The disease is thought to be most prevalent in the corvid family – Crows, Ravens, Magpies and Jays and the highest rates are found in Crows (18 % of those tested in 2002). Surprisingly, however, the lowest rates are found in Ravens (2.5 %), even lower than in species not believed to be at risk. While Crows and Ravens are closely related, Crows are much more common in heavily urbanised areas. (CCWHC, 2002).

**Human cases of disease with positive West Nile tests are even more urbanised.** Greater Toronto has 44% of Ontario's population but 82% of the 65 cases in 2002 that were confirmed positive. The only other significant hotspot is Windsor, which has 3.3% of the population yet 10.7% of the West Nile cases. It also has "anomalously high rates" of disease, death and congenital abnormalities which are blamed on local pollution and its proximity to Detroit.

Studies have also shown that certain chemicals such as **DEET and permethrin** can make the **blood-brain barrier more permeable to viruses including WN virus.**

**An exposure to synthetic chemical pesticides may be substantially more dangerous to human health than a mosquito bite.**

**Pesticides can cause a multitude of health problems that may appear only later, sometimes even decades after exposure. The pesticides also increase the risk of developing WNV encephalitis because they suppress the activity of the immune system and they may also make the brain-blood barrier more permeable to WNV.**

In the years since the first outbreak, the CDC and local vector control agencies have altered their public recommendations on dealing with West Nile. There is now a much greater emphasis on public education, on the removal of standing water as mosquito breeding sites, and application of larvicides instead of widespread sprays targeting adult mosquitoes.

## APPENDIX 5

**VN virus Illness – Clinical Pictures**

[http://www.health.gov.on.ca/english/providers/program/pubhealth/westnile/wnv\\_03/wnv\\_phy\\_pa](http://www.health.gov.on.ca/english/providers/program/pubhealth/westnile/wnv_03/wnv_phy_pa)

The incubation period for West Nile virus (WNV) ranges from 3 to 14 days. WNV illness can be considered to consist of two clinical pictures: WNV Fever and WNV Neurological Manifestations.

Data from the U.S.A. indicate that most WNV infections are often clinically unapparent or mild. Approximately 20 % of those infected develop a mild illness (WNV Fever).

Most people who are infected never get sick, yet **virtually every infected person becomes immune to the disease** for life. In some villages along the Nile, positive serologies range up to 100 %. Approximately 1 in 150 (0.7%) of infections will result in severe neurological disease. The most significant risk factor for developing severe neurological disease is advanced age.

**WNV Fever** – WNV Fever is the milder form of WNV illness. Clinical symptoms include a febrile illness of sudden onset plus one or more of the following: malaise, anorexia, nausea, vomiting, headache, eye pain, photophobia, arthralgia, myalgia, maculopapular rash, and lymphadenopathy. However, the complete clinical spectrum may not yet be recognized.

**WNV Neurological Manifestations (WNNM)** – The clinical picture of WNV Neurological Manifestations may include the symptoms of WNV Fever. Symptoms of encephalitis are more commonly reported than meningitis. Symptoms may include change in mental status, severe muscle weakness, flaccid paralysis, myelitis, seizures, polyradiculitis, cranial-nerve abnormalities including optic neuritis, ataxia and extrapyramidal signs. In addition the occurrence of acute flaccid paralysis and poliomyelitis-like syndrome has increased and/or been documented for the first time during the 2002 outbreak.

People naturally assumed that as the West Nile virus became more entrenched, it would spread around the country and that each year would bring more cases than the last. Scientists say that view is at least partly mistaken.

Most people who are infected never get sick, yet virtually every infected person becomes immune to the disease for life.

**Encephalitis/meningitis** due to WNV cannot be clinically distinguished from other viral causes of encephalitis/meningitis. According to Dr. Michael Gochfeld, West Nile virus encephalitis accounted for only 5% of the encephalitis death in the NY-CT/NJ area in the year 2000.

About one in 150 people bitten by an infected mosquito will develop meningitis, an infection of the spinal cord, or encephalitis, an infection of the brain. Either condition can cause death or permanent injury. Many of those who have succumbed to the virus have been older, chronically ill, or with weak immune systems.

# **PESTICIDES: THEIR MULTIGENERATIONAL CUMULATIVE DESTRUCTIVE IMPACT ON HEALTH ESPECIALLY ON THE PHYSICAL, EMOTIONAL AND MENTAL DEVELOPMENT OF CHILDREN AND FUTURE GENERATIONS**

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CANADIAN GOVERNMENT  
RESPONSIBILITIES  
AND  
**OPPORTUNITIES**

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Submission to The House of Commons  
Standing Committee on Environment and Sustainable Development

February, 2000

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Revised February, 2002

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# **WHY WE NEED A BAN**

## **ON THE UNNECESSARY USE OF PESTICIDES**

***Weedkillers and other chemical pesticides are deliberately made to be poisonous*** in order to kill or slowly destroy undesired forms of life. Once pesticides or other chemicals have been released into the environment, controlling their spread is impossible. They may be carried through the food chain, global air currents and other means and they may even spread to another hemisphere.

**Our cells, the structural building blocks of our bodies, as well as our main metabolic processes, are basically the same as those of other life forms. Therefore, exposure to weedkillers and other chemical pesticides can be harmful to humans. It is now being recognized as a serious health threat, especially to pregnant women and children.**

**Pesticides have cumulative multigenerational destructive and degenerative impacts on human health, especially on the physical, emotional and mental development of children.**

**Pesticides can cause birth defects and interfere with proper sexual differentiation. They can also trigger allergies, immunotoxicity, neurotoxicity, genetic damage, cancer and other health problems. These health problems may then be transmitted to the children of the affected individuals, and to subsequent generations.**

- **Pesticides have been detected in the body tissues of *all* peoples tested.** The only exceptions were Indian tribes in the depth of the Amazon jungle, still protected at the time of testing from global pollution by a dense forest canopy.
- **Once released into the environment, the spread of pesticides cannot be controlled.** Radioactively traced pesticides sprayed over the UK were detected 5 - 7 days later in the southern USA. Traces of insecticides used in tropical areas were

detected in the Arctic. Global air currents, hurricanes, etc. can transport pesticides and other chemicals worldwide.

- **Our youngest generation is already exposed to pesticides not only prenatally but even before conception.** Pesticides have been detected in the perifollicular fluid surrounding the eggs of infertile women who were residents of major Canadian cities and who had no history of unusual exposure to these substances.
- **Pesticides and other pollutants penetrate the placenta** – the fetus' protective shield. Never before has humanity been so exposed to these persistent organic pollutants and therefore humanity has developed no protection against them.
- A Canadian-American study detected **pesticides in the amniotic fluid** in 1/3 of human pregnancies.
- **Nowadays our children are born with a deposit of toxic pesticides and other foreign chemicals caused by the dumping of the maternal lifelong storage of pesticides**, (the so called "body burden") into the body of the developing child.
- **After birth, children "inherit" an additional load of pesticides and other harmful chemicals through breastfeeding and from the environment.** They will continue to receive additional pesticides daily, mainly from food, especially vegetables and fruit.
- **Prenatal life and early childhood are especially vulnerable periods** because cells are dividing rapidly and detoxifying enzymes have not yet developed.
- **Pesticide exposure levels are higher in children in relation to their body weight than in adults.** This is because: children consume more foods with pesticide residues – e.g. juices, vegetables, fruits and water; their detoxifying enzymes have not yet fully developed; their skin is thinner and; when playing on sprayed lawns they are not protected by pesticide applicator safety gear.
- **Ozone and pesticides:** pesticides such as **methylbromide** are a major threat to the ozone layer, **destroying** 30 to 120 times **more ozone** than chlorine.

Pesticide residues, especially with chronic exposure, and even at low levels, may have multigenerational, carcinogenic, immunotoxic, neurotoxic and other serious health damaging consequences. **Even a single exposure to pesticides may be the "final straw"** in triggering health problems such as environmental hypersensitivities; allergies; chronic fatigue syndrome; behavioural changes such as irritability, anxiety, depression, aggressiveness; personality changes; concentration, memory, learning problems; hormone disruption; defective sexual development; masculinization of women; feminization of men; sperm reduction and abnormalities; erectile dysfunction; loss of libido; as well as other health problems and birth defects.

The consequences are especially serious for children. These impacts, because they are cumulative, are frequently multigenerational and more and more destructive with each subsequent generation.

**When chemical pesticides were first introduced in Europe about half a century ago, cancer in European children was practically non-existent because industrialization, including the use of pesticides, started later than in North America. Now, nearly every children's hospital has a cancer wing, similar to the situation on this continent.**

In 1985, the American Cancer Society projected data estimating that **1/3 of American children** born in that year **would develop invasive cancer** (excluding non-melanoma skin cancer) during their lifetime and that **2/3 of these would eventually die** of the disease. **The risk is actually higher** because the incidence of cancer is increasing at a rate greater than expected. In 1998, according to projected data, a typical North American male had an **estimated 50% risk of developing invasive cancer**. **It is generally accepted that 70-90% of all cancers are due to external causes, and are, therefore, preventable.**

When the use of chemical pesticides started they were considered a "wonderful safe approach" to control pests. Now pesticides contaminate our bodies and the bodies of our children, even before their birth; working to destroy many species, our environment, our pets - and us...

**We risk the health of Canadians, especially the development of our children and future generations, if we do not stop the indiscriminate use of pesticides. Therefore we should have an IMMEDIATE MORATORIUM on any unnecessary use of weed killers and other chemical pesticides.**

## 1.0 INTRODUCTION

There is a growing concern regarding the lack of awareness and knowledge of the serious multiple and **multigenerational impacts of common weedkillers and other chemical pesticides on human health**. It is becoming obvious that **pesticides pose a particularly serious threat to the physical, emotional and mental development of children and future generations(1-14)**.

Due to the basic similarity between humans and other forms of life at the subcellular level, it is impossible to achieve target selectivity when using chemical pesticides. Cells are the basic structural unit of plants (including molds), insects, animals and human beings. Despite the differences in the details of our cells, we all share the same basic cell blueprint. Every cell is a microscopic bag with a nucleus, containing chromosomes in the form of DNA, and a fluid material called cytoplasm. Every cell is surrounded by a membrane – an “outer skin,” which contains additional specialized structures such as mitochondria for the generation of energy.

Because we share the **common basic structural blueprint as well as basic biochemical patterns with other life forms**, **chemical pesticides** affect more than the intended target. They produce “toxic broad spectrum” impacts, killing or **damaging** various useful insects, animals, plants and also human health. Fungicides and herbicides (weedkillers) are somewhat specific in their actions; pesticides such as insecticides, rodenticides, and other biocides are known to be as poisonous to non-target organisms as they are to pests. As stated by Agriculture Canada, “Pesticides are designed to kill... All chemical pesticides are harmful to humans(5)”.

Pesticides have now been detected in the body tissues of **everyone** tested, regardless of country and place of origin, residence, type of work, age, sex or social class. The only populations without detectable pesticides were certain Indian tribes who, at the time of testing, lived in the depths of the Amazon jungle protected from global pollution by a dense rainforest canopy.

Another reason for concern is that the use of pesticides, such as methylbromide, is still permitted despite the knowledge that this pesticide has a serious destructive effect **on the ozone layer**. Methylbromide destroys 30 to 120 times more ozone than does the comparable chemical chlorine(16-17).

Once pesticides or other **chemicals** are released into the environment, their **spread cannot be controlled**. They are transported indiscriminately, mainly through the air and water, but also by animals and insects and the food chain. They frequently travel thousands of miles from the point of origin. The winds, rain, hurricanes, and global air currents can spread pesticides and other pollutants all around the world.

***Our inability to control the spread of chemicals in the environment was already recognized (and subsequently forgotten) almost one century ago. After World War I the use of chemical weapons was banned, mostly because it was impossible to contain their impact to one area.***

**2.0 PESTICIDES EXPOSURE: PRENATAL AND POSTNATAL  
TRANSFER OF THE MATERNAL PESTICIDE "BODY BURDEN" TO  
OFFSPRING AND THE MULTIGENERATIONAL, ESCALATING,  
DESTRUCTIVE IMPACT ON HUMAN HEALTH - CANCER,  
NEUROTOXICITY, IMMUNOTOXICITY, HORMONE DISRUPTION,  
ABNORMAL SEXUAL DEVELOPMENT, BIRTH DEFECTS, AND  
OTHER HEALTH PROBLEMS**

## 2.1 What are Pesticides?

The term "pesticide" is presently used to describe a very broad range of synthetic substances designed to control or kill undesired forms of life. Pesticides include agents for eliminating insects (insecticides); mites (miticides); weeds and unwanted vegetation (herbicides, generally known as "weedkillers"); fungi (fungicides) and: rats, mice and other "vermin" (rodenticides). Fumigants are another class of chemical pesticides used to kill a variety of pests by fumigation in confined spaces such as grain elevators and other food storage facilities.

As explained previously, due to the basic similarity between humans and other forms of life at the cellular and subcellular level, it is impossible to achieve target selectivity of chemical pesticides. Chemical pesticides are powerful biological poisons and can cause:

- direct toxicity to the applicator or consumer, especially to pregnant women and children;
- the development of strains of pests that are resistant to a pesticide;
- the destruction or damage of non-target organisms such as parasites (predators of pests) honey bees and other pollinators as well as fish, birds and other wildlife;
- outbreaks of other pests that are no longer controlled by their natural enemies;
- the accumulation of harmful residues in crops;
- harmful impacts on domestic animals, wildlife, and the environment;
- the potential to contaminate surface and underground water;
- multiple destructive impacts on human health, especially the behaviour and development of children and future generations(1-14).

In his book, "From Naked Ape to Superspecies"(19), David Suzuki writes:

*"A lesson to be drawn from the Biosphere project is that the small, usually overlooked aspects of our ecosystem – the insects and the microorganisms – are in many ways the most important. Insects, for example, make up the most*

numerous, diverse and successful group of animals on Earth, and only a minute percentage is harmful to or competitive with us. When scientific technology developed powerful weapons like chemical pesticides to use against them, we ended up killing thousands of species just to get at the less than one percent that we find troublesome. We are beginning to see that insects and microorganisms are vital parts of ecosystems: they form a major portion of the diets of birds, fish, mammals and amphibians, and as predators are still the main force keeping other insects under control ..."

## 2.2 Penetration of our Bodies by Pesticides and Their Multigenerational Impacts: Cancer, Neurotoxicity, Immunotoxicity, Hormone Disruption, Abnormal Sexual Development, Birth Defects and Other Health Problems

Over millions of years of evolution on earth, various life forms, as well as humanity, had ample time to adapt to a slowly changing environment. However, during the last half of the last century we all have been exposed to a dramatic, ever-increasing number of pesticides and other synthetic chemicals - often toxic - in the air we breathe, the water we drink, the food we eat, the soil in which our produce is grown, the homes in which we live, the places where we work, schools, playgrounds, golf courses, shopping centres, restaurants, theatres, hotels, airplanes, and other public places, including hospitals. Pesticides "drift," and toxic chemicals can spread thousands of miles from the site of the initial application. Overexposure to them exceeds our ability to adapt to various substances foreign to our human body chemistry.

In 1986, the Chemical Abstract Series (CAS), a division of the American Chemical Society, listed more than 7.5 million distinct chemicals, based only on papers published since 1965 and was **registering about 10,000 new chemicals each week**. As of December 1999, its database included records of **over 22 million registered chemical substances**, and was registering about **25,000 new chemicals each week**(20).

**Many of these chemicals, especially pesticides, are biologically active and toxic.** They may accumulate in the human body and cause **health problems immediately or even several decades after exposure**. The final response to such exposure depends on many factors, known and unknown. Some individuals may manifest clinical symptoms while others may not.

The full long-term health consequences of chronic exposure to pesticide residues are unknown because we do not have any long-term historical comparison studies from which to draw conclusions. However, it is documented that:

- **pesticides have neurotoxic(21-23), immunotoxic, carcinogenic, hormone disruptive and other health damaging impacts (1-14,18,19,22,24). About 60 percent of pesticides available in the USA act as hormone disruptors(22). A similar situation exists in Canada.**

## 2.2.1 Increased Susceptibility to Pesticides During Intrauterine Life. Their Multigenerational Impact on Physical, Emotional and Mental Development

The developing fetus is especially susceptible to pesticides:

- almost all **pesticides** and **other pollutants** cross the placenta, the natural protective shield for the fetus(24,25);
- pesticides and other pollutants have been **detected in the amniotic fluid and body tissues of human fetuses** even during the early stages of prenatal life(25,26);
- exposure to pesticides causes **many problems** including the risk of miscarriage(4,7,12,24,27);
- the **fetus is particularly susceptible** to the impacts of pesticides and other pollutants because
  - *its cells divide rapidly*
  - *its bloodbrain barrier is more permeable than in adults*
  - *its detoxification enzymes are not yet developed*
- prenatal exposure to **pesticides** acting as **hormone disruptors** can cause defective sexual development and other **birth defects**(4,25);
- **intrauterine exposure to pesticides may cause cancer at any time within the first few decades of life**(6,12,25);
- **such exposure may also predispose similar health problems in the offspring and subsequent generations of those individuals**(24).

## 2.2.2 The Role of Pesticides In the Increasing Incidence of Testicular, Prostate and Breast Cancers, Brain Tumours and Other Malignancies as well as an Increasing Incidence of cancer in Children and Animals

*Cancer is characterized by the partial or complete loss of control over the multiplication of cells and the development of a local tumour mass which often spreads into distant organs through a process called metastasis. Cancer kills mainly through a local spread which destroys an essential body function, or through the effects of metastases on other vital organs, such as the brain, liver or lungs.*

*Cancer is the most important cause of premature mortality in both sexes. It is the second most common cause of death in Ontario after all forms of cardiovascular disease.*

*The growth of cancer begins when the oncogenes (genes controlling cell growth and multiplication) in a cell or cells are transformed by agents known as carcinogens.*

*Once a healthy cell is transformed into a tumour-forming type (malignant transformation), the change in its genes is passed on to all offspring cells. A small group of abnormal cells is thus established, and these abnormal cells divide more rapidly than the normal surrounding cells. Usually the abnormal cells show a lack of differentiation – that is, they no longer perform the specialized task of the cells of their host tissue – and may escape normal bodily control.*

*The effects of carcinogens on tissue appear irreversible. Exposure to small doses of a carcinogen over a period of time results in a summation or potentiation of the carcinogenic effect. It is important to realize that the incidence of cancer today reflects exposure that occurred fifteen, twenty or even more years ago. Any increase of carcinogenic contaminants in the environment today will lead to carcinogenic effects some fifteen to twenty years later... for this reason, it is urgent that every effort to detect and control sources of carcinogenic contamination be made well before damaging effects become apparent(22).*

**Since the widespread introduction of chemical pesticides, followed by an expected latency period (a time interval between exposure to a carcinogen and the clinical appearance of cancer), there has been a steady increase in the incidence of certain cancers in adults as well as in children:**

- in 1998, according to projected data, a typical **North American male** had an **estimated 50 percent risk of developing invasive cancer**(23);
- **farmers, manufacturers and applicators of pesticides** have an **increased risk** of certain types of malignancies, especially cancer of the lip, prostate cancer, testicular cancer, lymphoma, leukemia, brain tumours, pancreatic cancer, sarcoma and multiple myeloma(1-14);
- apart from cancer of the lip, **the same type of malignancies** as noted above appear to be **rising** also - although less sharply - **in the global population, especially in immunodeficient patients**(2,3,7-14,22,6-28);
- these epidemiological findings suggest that the **globally rising trend of prostate cancer, testicular cancer, lymphoma, leukemia, brain tumours, pancreatic cancer, sarcoma and multiple myeloma is related to pesticide exposure**(1-14,22,26-28);
- **it is generally accepted that 70 to 90 percent of cancer is due to external factors and is therefore preventable**(22,24).

**In adults, the majority of cancers are carcinomas** (1-3,7,8,10,11,13,14). They arise frequently in the membranes of those organs which are **in contact with the outer environment**, i.e., in the bronchi due to exposure to tobacco smoke and polluted air or in the colon due to nitrates, pesticide residues in foods, and other chemicals such as some food additives and certain food colors.

In adults – in contrast to childhood malignancies – the majority of cancers are the result of damage by external factors. Whereas the malignancies starting in deep tissues, bones, muscles and connective tissues (sarcomas) are rare.

Exposure to pesticides increases the risk of many types of cancer, especially hormone-dependent cancers:

- testicular cancer - “the cancer of young men”(22,24)
- prostate cancer(8,22)
- breast cancer(30-34)

There has been a sharp increase of testicular cancer – “the cancer of young men,” and especially a dramatically increasing incidence of prostate cancer worldwide. Both testicular and prostate cancer have been linked to the use of pesticides(8, 29).

The incidences of testicular and prostate cancer are significantly elevated in pesticide applicators as well as in young farmers and they are positively correlated with the amount of pesticides they were handling(8, 36). In older generations of farmers who did not use pesticides, however, the cancer incidence is lower than in the rest of the population.

In their book “Our Stolen Future: – Are We Threatening Our Fertility, Intelligence, and Survival?” Theo Colborn, Dianne Dumanoski, and John Peterson Myers write(24):

*... average human male **sperm counts have dropped by almost fifty percent between 1938 and 1990.** At the same time, the incidence of testicular cancer, “the cancer of young men”, had increased sharply ...*

*Beginning in the 1950s, many of the disturbing wildlife reports involved defective sexual organs and behavioural abnormalities, impaired fertility, the loss of the young or the sudden disappearance of entire animal populations. In time, the alarming reproductive problems first seen in wildlife, touched humans, too ...*

*... genital abnormalities such as undescended testicles and shortened urinary tracts were on the rise among young boys. Because of the changes in sperm counts and quality, and because the increase of genital abnormalities had occurred over such a short period of time, the researchers ruled out genetic factors. Instead, the changes appeared due to some sort of environmental factor ...*

*... researchers noted abnormal sexual development in some males, paralleling one of the most striking effects recorded in wildlife literature. Like the alligators in Lake Apopka, these boys have significantly shorter penises than those unexposed boys ...*

**Breast cancer** has become one of the major causes of death in women in North America and many other countries. In the past 40 years, the incidence of breast cancer has been steadily and dramatically increasing all over the world. Known factors account for approximately one third of the breast cancer cases, while two thirds of breast cancers are due to unknown causes.

Along with the dramatic and steadily increasing incidence of breast cancer, the cancer is also becoming more malignant because it is affecting women at a younger and younger age. It is well documented that the younger the woman at the onset of the breast cancer, the greater and more rapid the tendency of the cancer to spread to other parts of the body and to kill the patient.

Breast cancer has been linked to exposure to organochlorine pesticides. A DDT metabolite called DDE was found to be the most prevalent pesticide detected in breast biopsies(22). In women with breast cancer, DDT and DDE levels were especially elevated(22).

**In Israel, after a reduction in allowable levels of DDT and related pesticides in dairy products, breast cancer deaths in younger women dropped by 30 percent(22).**

A high fat diet has been accepted as one of the major causes of breast cancer in women. Epstein stresses the reason that a high fat diet increases the risk of breast cancer is the presence of carcinogenic pesticides which concentrate in animal fats and are known to cause breast cancer.(22).

**Childhood types of cancer** differ from those in later life. In children, greater proportions of cancer are found **in the deep tissues** of the body: in the brain - brain tumours; in the bone marrow – leukemia; in lymphatic glands – lymphoma and; in the bones – sarcoma.

The location of childhood cancers in the deep tissues of the body apparently **reflects an exposure to pesticides and other pollutants during the prenatal development of these tissues;**

- as mentioned previously, it is generally accepted **that 70 to 90 percent of all cancers are due to external causes(24). Therefore, they are preventable** by avoiding carcinogens, especially tobacco, pesticides, and other environmental carcinogens;
- a National Cancer Institute study reported that **children are as much as six times more likely to get childhood leukemia when pesticides are used in the home and garden.** This study can also explain why the **incidence of leukemia is about six to seven times more frequent in children from higher social classes** – their exposure to pesticides is higher **because of the “manicured” lawns and gardens** surrounding them(22,35);
- with the **growing number of childhood and early adulthood cancers**, it can be expected that the ratio between cancer due to external and hereditary causes may be changed because there will be a growing number of individuals who may **transfer the genetic damage predisposing people to cancer to their children and further generations.**

Prior to the introduction of pesticides about **half a century ago, cancer in European children was practically nonexistent**. The European population, at that time, was **less exposed to various chemicals**, because industrialization, including the use of pesticides, started later than in North America. The rarity of childhood cancer at that time can be documented by cancer registry statistics and the results of autopsies, which were mandatory in some European countries. **Presently, with the use of pesticides and the existence of high pollution in Europe, the incidence of cancer in children and adults has been steadily increasing, especially in Eastern Europe. In Canada and many other industrialized countries today, almost all hospitals for children have a special cancer wing.** The steady rise of various types of cancers is also observed in wildlife and domestic animals(36).

Children are relatively more exposed to pesticides than adults because:

- they are **already exposed** to pesticides and other chemicals, even **before their birth, due to the shift of the pesticides** and other pollutants from the body of the mother(25) through the placenta to the body of the developing fetus;
- they are exposed through **breastmilk contaminated** by pesticides and other chemicals(22,37);
- their detoxifying **enzymes are not yet fully developed**(22,24);
- their bloodbrain barrier is more permeable than in adults, allowing the **penetration** of pesticides and other fat-soluble pollutants **into the brain tissues** (24,25);
- children consume relatively **more food items containing pesticide residues**, such as **vegetables, fruit, juices and water** in relation to their body weight than adults(38);
- children have **thinner skin** and are not protected by the applicator's safety gear when playing on **sprayed lawns**(22,24).

### **2.2.3 Neurotoxicity – The Impact of Pesticides on the Human Brain**

In April 1990, the Office of Technology Assessment (OTA) of the **US Congress** released an extensive **report** entitled "Neurotoxicity: Identifying and Controlling Poisons of the Nervous System."(23). The two top targets of the report are chemical pesticides and pharmaceutical drugs. The OTA report expresses concern that research projects have not adequately addressed **neurotoxicity of these substances – a major issue for the survival of humanity as we know it:**

**... very few new and existing chemicals have been evaluated specifically for neurotoxicity. Of particular concern are the delayed**

effects of some of the organophosphate pesticides. Organophosphate and carbamate insecticides are the most common causes of agricultural poisonings. Some substances, such as malathion, an organophosphate pesticide, can permanently damage the nervous system after only one exposure(23).

The **majority** of the most widely used **pesticides** are **designed to disrupt** the normal functioning of the **nervous system** of the target organism;

- because our cells are basically similar to the cells of plants, insects and animals, it is impossible to achieve target selectivity of pesticides; this basic similarity is also valid at the subcellular level of the human brain, which is, therefore, also vulnerable to pesticides;
- the brain contains large amounts of fatty substances and, therefore, fat-soluble **pesticides and other fat-soluble pollutants** have a tendency to **accumulate in the brain(23)**;
- **when** residues of fat-soluble pesticides and other pollutants are **detected in the blood**, there is a significantly greater concentration of the same compounds in other body tissues as a result of complex equilibrium mechanisms. In many cases, the **concentrations in tissues** with high fat content may be **100 to 300 times greater** than in the blood(23). Because the brain is an organ with a high fat content, it is not surprising that behavioural changes, such as **emotional imbalance, depression, concentration and memory problems** are the **most sensitive** indicators of exposure to fat-soluble chemicals such as certain pesticides(23,24);
- the brain is **especially vulnerable** to pesticides and other pollutants **during the early period of development** (conception to puberty)(23);
- exposure to pesticides can impair **concentration, learning abilities and memory, and can trigger aggression, mood changes and other behavioural disturbances(23)**;
- research carried out at Harvard Medical School shows that human exposure to **minute amounts** of some pesticides can alter brain activity and cause prolonged periods of irritability, insomnia, loss of libido and a reduced ability to concentrate(22);
- the **first** subtle signs of pesticide exposure are **emotional imbalance and difficulty recalling names and words(22)**;
- there is a steadily growing number of Canadian children, as well as children worldwide, suffering from hyperactivity and learning disabilities, labelled today as attention deficit disorder (ADD) and attention deficit disorder with hyperactivity (ADHD)(23,24);
- **individuals occupationally exposed to pesticides** (farmers, manufacturers and pesticide applicators, etc.) have an increased **risk of neurotoxic deficits**, including a significantly higher incidence of **Parkinson's disease(21,23)**;

- the **brain damage** may manifest itself **only in later life**, for example, as either **memory impairment** or **dementia**, frequently labelled as Alzheimer's disease(21).

## 2.2.4 *Pesticides as Hormone Disruptors*

Hormones are chemical messengers essential for proper prenatal and postnatal development, especially the development of the reproductive system, brain and immune system.

Hormones bind with receptors, specifically, tailored cell proteins. The receptor and its hormones activate the genes. Hormone-disrupting chemicals interfere with the manner and timing of this procedure. If the hormone signals come too early, too late or not at all, the organism may be unable to start, or develop or function normally. For example:

- female offspring of women who took diethylstilbestrol (DES) (a synthetic estrogen administered to prevent miscarriages) encounter more difficulty in conceiving, and have more miscarriages, spontaneous abortions, and tubal pregnancies. Male offspring have a higher incidence of reproductive tract anomalies such as abnormally small penises, undescended testicles at birth, and low sperm counts(24).

**Prenatal exposure to pesticides acting as hormone disruptors can cause defective sexual development and other birth defects(25):**

- traditional testing of pesticides on fully developed adult animals does not detect the devastating anti-androgen effects that contribute **to the demasculinization of males**(24);
- there are **no standardized** or validated **screens for the impact of pesticides on the embryo and fetus**(24);
- **insecticides** (used widely in household and pet-care products as well as agriculture formulations) when fed to pregnant animals, acted as both an estrogen and an anti-androgen, thus **feminizing or demasculinizing** the male pups(24);
- average human **male sperm** counts have **dropped by almost fifty percent** between 1938 and 1990, and they **continue to decline**(24).

## 2.2.5 *Correlations Between Elevated Pesticide Levels and Disease*

- a correlation has been observed between levels of **5-10 ppb of pesticides** in blood serum and various biochemical **abnormalities and illnesses**(24);

- **elevated levels of pesticides** are present in people with all types of **cancer** or in the **terminal** stage of **various diseases** when compared to healthy people(24);
- groups with **especially increased susceptibility** to pesticides are: **children**; especially during the period from conception to puberty; **pregnant women**; **AIDS** patients and individuals with certain chronic health problems such as **asthma, dermatitis, chemical hypersensitivities, lupus** and **vasculitis**(24).

## 2.2.6 Long-Term Impact of Pesticides on Human Health and Nature

The long-term consequences and the full impact of exposure to pesticides cannot be predicted, because there has been no parallel situation of such drastic chemical exposure in all of human history;

- proper animal **models do not exist**;
- the accumulation of pesticides from many different sources including food, water and air creates a **total load** and the impact of this load cannot be predicted(22);
- it is not possible to predict the **synergistic effects** of exposure to other pollutants, the so-called non-active, inert ingredients of pesticides(22);
- many "**non-active ingredients**" are **toxic** and sometimes even more toxic than the active pesticide substance(22);
- some pesticides are known to **break down in the human body into even more toxic compounds**(22);
- because of **interactions** with many other factors, the individual response to pesticide exposure may vary - some individuals may manifest clinical symptoms, while others may not.

In his article, "The Folly of Chemical Pest Control", David Suzuki states:

**Insects make up the most numerous and diverse group of organisms on this planet. They represent more than 99 percent of all animal species. They are the most important component of the ecosystem, an integral part of the food chain. They provide sustenance to animals, mammals, birds, fish and insects, while keeping many other species in check. Without insects, the vast majority of flowering plants would not be able to reproduce. A miniscule fraction of this huge group of animals are pests to human beings ...**

**Spraying powerful poisons that kill all exposed insects is no more 'management' of pests than killing everyone in New York City would be managing urban crime ...**

In the beginning, DDT seemed an incredible invention, a potent insecticide at vanishingly small doses and apparently harmless to all non-insect life. What we didn't realize was that DDT was a novel compound to which life had never been exposed. And there is no biodegradation -- the stuff hangs around ...

In time it is absorbed by microorganisms, which are consumed by larger organisms, and so on up the food chain. Because there are no detoxifying or degradative mechanisms, at each step the compound becomes more concentrated ...

... the phenomenon of biomagnification would not have been predicted before DDT was used, because it was only when eagles and falcons began to go extinct that this was discovered ... and when DDT was detected in breast milk where it becomes many times more concentrated ...

**The most obvious solution is to kick the habit.** But ever confident in the power of our technological dexterity, we are turning to yet another technological solution. We will apply our newest and most exciting manipulative abilities, namely **genetic engineering**, to **make crop plants more resistant to chemicals, thereby allowing us to use even higher concentrations and more powerful compounds** to keep up the illusion that we are managing forests and farms ...

And where will this Alice in Wonderland thinking take us? It must **lead to more and more human diseases caused by the accumulation of these toxic compounds ...**

### **3.0 PERSISTENCE OF PESTICIDES**

#### **3.1 Tendency of Pesticides to Remain Active**

**Many pesticides remain active for years**, while others can remain active for days, weeks or months. They can accumulate over the years in soil or ponds, etc., and are absorbed by certain plants or are released by soil organisms to impact further on the environment and living organisms. Examples of pesticides known to accumulate are:

- **2,4-D**, which may -- under certain conditions -- have a lifespan of **up to six weeks**. 2,4-D is **commonly sprayed** in parks, schoolyards and home gardens. Also, during the manufacturing process, 2,4-D may be contaminated by a highly toxic **bypass product, dioxin**(39). Thus, all persons using areas sprayed with 2,4-D are potentially exposed to dioxin. Such a risk is **particularly high** for **small children playing on treated lawns**. 2,4-D was a component of Agent Orange, one of the primary chemical weapons used as a defoliant during the Vietnam War(22);
- **aldrin**, which has been recovered after **four years** in trace amounts (and more abundantly, as dieldrin)(22);
- **toxaphene** , which may remain in sandy soil for **ten years**(22);
- **chlordan**e, of which residues can remain active for **20 years**(22).

### 3.2 Global Pesticide Spread Via Air, Water and Food

**In the past, studies focused on workers occupationally exposed to pesticides and populations in third world countries**, where exposure was high due to overuse of pesticides. The main route of occupational exposure to pesticides is through the skin. Studies have confirmed that children of adults exposed to pesticides in their workplace can be negatively affected by the pesticides' residues on their parents clothing and skin(27).

**However, nowadays, pesticides are detected in the body tissues of all people** tested, regardless of country, place of origin, residence, type of work, age, sex or social class(22). The only group without detectable pesticides was a population of Indian tribes living during the time of testing in the depths of the Amazon jungle, which remains protected from global pollution by a dense rainforest canopy(22).

**Once pesticides are released into the environment, their spread cannot be controlled.** Pesticides are widely dispersed in the environment and are further spread by air, water, rainwater and the food chain. They have been detected in human and animal body tissues **at locations thousands of miles from their initial application**(18):

- global air currents, hurricanes, etc. can even transport **pesticides** and other chemicals **from one hemisphere to another**(18);
- radioactively traced **pesticides sprayed over the UK** were detected 5 - 7 days later in the **southern USA**(22);
- pesticides and other industrial chemicals never used in the Arctic have been detected in the body tissues of polar bears and in the breast milk of women living in the Far North(22);
- traces of **insecticides used in tropical areas** were detected in **Arctic plants**(18);

- **DDT, although banished in this country** a long time ago, is coming back to Canada and **accumulating in our bodies** and the bodies of our children **via foods imported** from countries where its use is still permitted;
- **our youngest generation is exposed to pesticides even before conception as well as during their prenatal life**(25,37). Pesticides and other industrial chemicals were detected **in the ovarian perfollicular fluid** surrounding the eggs of infertile women residing in **major Canadian cities**. **None** of these women had **any unusual exposure** to pesticides or other pollutants(22);
- **pesticides and other pollutants are able to cross the placenta** – which acts as a protective shield(25). There was no such prior exposure in our history. Therefore the body has no developed protection;
- a recent joint Canada-USA study of pregnant women detected **pesticides** in the **amniotic fluid** in one third of all cases(25);
- **in 1985 the American Cancer Society's projected data estimated that one third of all American children born in 1985 would develop invasive cancer** (excluding non-malignant skin cancer) at some point in their lifetime and that **two thirds of these individuals would die** of this disease(40);
- the above estimate is based on the assumption that the current cancer incidence is maintained. However, the **cancer risk** for American children (as well as Canadian children) **is actually higher** than this estimate because the incidence of cancer is increasing steadily each year. For example, according to projected statistical data, in 1998 a typical **North American male** with no particular exposure to pesticides or pollutants had **an estimated 50 percent risk of developing invasive cancer** sometime during his lifetime(40):

Pesticides also travel through food webs:

- organochlorine pesticides are stored in the fat of animals and then they accumulate in the bodies of other animals or humans who consume them(25);
- some organisms, such as fish, concentrate certain pesticides and other pollutants in their bodies directly from contaminated water(37).

In their book, "Our Stolen Future; Are We Threatening Our Fertility, Intelligence and Survival?" Theo Colborn, Ph.D, and his co-authors Dianne Dumanoski and John Peterson Myers state(24):

***Virtually anyone willing to put up the \$2,000 for the tests will find at least 250 biochemical contaminants in his or her body fat, regardless of whether he or she lives in Gary, Indiana, or on a remote island in the South Pacific. You cannot escape them ...***

***These synthetic chemicals move everywhere, even through the placental barrier and into the womb, exposing the unborn during the most vulnerable stages of development. When a new mother breast-feeds her baby, she is giving it more than love and***

*nourishment: she is passing on high doses of persistent chemicals as well ...*

***Humans carry high enough levels of synthetic chemicals to endanger their children ...***

***In just six months of breast-feeding, a baby in the United States and Europe gets the maximum recommended lifetime dose of dioxin, which rides through the food web like PCBs and DDT. The same breast-feeding baby gets five times the allowable daily level of PCBs set by international health standards for a 150-pound adult ...***

*As the experience over the past half century has demonstrated, there is no way to put large quantities of man-made chemicals into the environment without exposing our children and ourselves to unknown risks ...*

CFCs had been in broad use for fifty years before the ozone hole was discovered over Antarctica. The lag time before effects emerge in vast, complex systems can give a false sense of safety and increase the opportunity for catastrophe ...(24).

### 3.3 Bioaccumulation and Biomagnification

Substances accumulate when organisms take in substances or elements at a rate faster than they can excrete or metabolize them. The body stores some substances for long periods of time and excretes them slowly.

The “**body burden**” is a term used to describe the load of accumulated pesticides or other pollutants stored in the body. This “burden” may be built up through the processes of bioaccumulation and/or biomagnification;

(A) **Bioaccumulation** is a process by which living organisms accumulate chemical substances or elements.

**1. Direct bioaccumulation**

occurs directly from an organism's encounter with the environment (eg., accumulation by fish of pollutants from surrounding water)(25).

**2. Indirect bioaccumulation**

occurs through the ingestion of food.

(B) **Biomagnification** is a process by which substances become more concentrated as they move successively through higher levels of a food web. At each higher step in a food chain, a steady increase in contaminants occurs.

For example, plants may retain and concentrate contaminants in soil. Animals that eat plants, (i.e., herbivores) may retain and concentrate contaminants from

the plants. Animals that eat herbivores (i.e., carnivores) may then retain and concentrate such high levels of contaminants that they experience toxic effects(22,24).

- **many classes of pesticides**, particularly organochlorines, are highly stable. They **resist degradation** and they **accumulate in the food chain, often at levels of more than a million times** those found in the environment.
- through the process of biomagnification, the **concentrations** of persistent chemicals that resist breakdown and accumulate **in body fat can be 25 million times greater** in a top predator, such as a herring gull, than in the surrounding water(24).

In the book(24), "Our Stolen Future; Are We Threatening Our Fertility, Intelligence and Survival?", Theo Colborn, Ph.D., states:

*As **PCBs** work their way up the food chain, their concentrations in animal tissue can be magnified up to 25 million times. Microscopic organisms pick up persistent chemicals from sediments -- a continuing source of contamination -- and from water; and are consumed in large numbers by filter-feeding tiny animals called zoo-plankton. Larger species like mysids then consume zoo-plankton, fish eat the mysids, and so on up the food web to the herring gull ...(24);*

- **during pregnancy the "body burden" of pesticides and other pollutants is shifted to the offspring**, both in animals and human beings(24);
- **in children**, as well as in animals, the **"body burden"** is further **increased through the shift of the mother's "body burden"** of pesticides and other pollutants **into the breastmilk**(24);
- in children, the **"body burden"** of pesticides and other pollutants is additionally **increased due to insufficient** activity of the **detoxification** enzymes during the neonatal period and early childhood(24).

### 3.4 Synergistic Effects of Pesticides

Pesticides may interact synergistically with other pesticides and contaminants, as well as natural components of the ecosystem. They may become integrated into the molecular processes of living organisms, including the bodies of humans. Additionally, the **chemical breakdown of pesticides** in the body can **produce substances** which are **even more toxic**.

**The synergistic effects** of pesticides may **increase toxicity**. The synergistic effects definitely **increase the risk of developing sensitivity**:

- rats exposed to EPN and malathion, two organophosphate pesticides, were found to have fifty times greater synergistic toxicity than those exposed to these chemicals individually(22);
- a similar type of synergism may occur with carriers that usually accompany pesticides as penetrating agents(22).

#### **4.0 PESTICIDE USE - AN INTENTIONAL SPREAD OF TOXIC CHEMICALS IN OUR ENVIRONMENT AND FOOD SUPPLY**

**Pesticides** hold a rather unique position among the many chemicals that humans encounter. They are **designed to be poisonous** and they are added to the environment deliberately **for the purpose of killing or slowly destroying** some undesired forms of life.

As mentioned previously:

**Due to the basic structural similarity at the cellular and subcellular level (mitochondria, etc.) between humans and other forms of life, all pesticides are also harmful to humans.**

**Pesticides rank with the most dangerous and ecologically disruptive agents known to science and they are spread throughout the environment by persons frequently ignorant of their hazards.**

Humans are coming into increasing contact with pesticides either through direct application, skin contact, inhalation, or the ingestion of food and water. It is estimated that up to 50 percent of pesticides used on lawns and crops contaminate our surface or ground water(22).

Undeniably, there are benefits associated with pesticide use, like increased crop production and aesthetically appealing fruits and vegetables. However, we must ask ourselves whether we have to use toxic substances to have our lawns and fruits and vegetables live up to our expectations.

#### **4.1 Steadily Increasing Production of Pesticides**

In spite of the recently increasing awareness of the potential of pesticides to cause severe delayed impacts on human health, especially the health of children, the worldwide production of pesticides is steadily escalating:

- in 1989, the annual world production of pesticides amounted to five billion pounds or about one pound per person. This production included 1600 chemicals(22). Worldwide pesticide use is still increasing, but exact data is not easily available;
- in the 1980's, between 400 and 500 million kilograms (i.e., 0.9 to 1.1 billion pounds) of pesticides were used each year in the United States -- representing about four pounds for each person in the United States annually;
- presently, the United States uses **30 times more** synthetic **pesticides** than in 1945. In this same period, the **killing power** per pound has **increased ten-fold**. Pesticide use in the United States alone amounts to 2.2 billion pounds a year, roughly **8.8 pounds per capita** - the weight of a well-developed newborn;
- annually, American farmers use over 560 million pounds of herbicides and fungicides (not counting other pesticides). According to the Environmental Protection Agency (EPA), 375 million pounds (**1½ pounds per citizen** per year) of these substances are probably or possibly **carcinogenic**;
- presently in **Canada** there are about **7500 registered pesticides**, of which about 40 are known to be carcinogenic or overly toxic;
- more than 50 million kilograms (more than 110 million pounds of pesticides) are used each year in Canada, representing almost **four pounds of pesticides for every Canadian annually**;
- the total annual weight of pesticides applied to the population of **Saskatchewan** each year amounts to four kilograms (**8.8 pounds**) **per person**;
- insects can acquire resistance to a particular insecticide or class of insecticide, necessitating progressively greater, more costly applications, and resulting in progressively smaller agricultural yields. This is a biological phenomenon known as the "**pesticide treadmill**"(22).

## 4.2 Significance of the Pesticide Residue Concentrations

### **Concentrations**

*The commonly used method of expressing concentration is by stating the percentage, i.e., number of parts of the given substance in the weight of 100 parts (100 percent), or in the number of parts, for example parts per million (ppm), or per billion (ppb) of the stated matter.*

*The concentrations of pesticides and other chemical residues in our food and drinking water are usually expressed in parts per million (ppm) or parts per billion (ppb). Such concentrations have been frequently compared to money -- (1 ppm = 1¢ in \$10,000; 1*

ppb = 1¢ in \$10,000,000), time, number of drops of water in an olympic pool, etc. Based on these comparisons, ppm and ppb amounts have been considered by many to be infinitesimally low or negligible, within tolerable limits, and without any health risks.

**However, the significance of ppm and ppb concentrations becomes more evident when approximating these concentrations with weight units of commonly prescribed medications and concentrations of such medications in human body tissues.**

"Pharmaceutical medications are usually prescribed in milligram quantities. One milligram of prescribed medication can be approximated to a concentration of 1 part per million (ppm) of body weight.

**1 ppm = 1 part per million = 1 milligram(mg) in 1 kilogram(kg)**

**1 kilogram (kg) = 1000 grams (gms) = 1,000,000 milligrams (mgs)**

**1 milligram (mg) = 1 part per million (ppm) in 1 kilogram (kg)**

**1 ppb = 1 part per billion = 1 microgram(mcg) in 1 kilogram (kg)**

**1,000,000 milligrams (mgs) = 1,000,000,000 micrograms (mcgs)**

**1 microgram (mcg) = 1 part per billion (ppb) in 1 kilogram (kg)**

- **Valium**, a widely used tranquilizer, is prescribed in milligram doses, most commonly a 5 mg tablet. If prescribed for a person whose weight is 100 kilograms (i.e. 220 pounds), the body tissue concentration will be 0.05 mg/1kg of body weight. This can be approximated to a Valium concentration of **0.05 ppm**;
- **Ativan**, another widely used tranquilizer, is usually prescribed in 1 mg doses representing **0.01 ppm/1kg** of body weight in 100 kg person;
- **vitamin B12**, necessary for the proper formation of red blood cells, cell production, normal growth, and nucleoprotein and myelin synthesis, is needed in microgram doses. The required daily allowance (RDA) **for adults** is 2 mcgs. For a person weighing 100 kgs, this is approximately a tissue concentration of **0.02 ppb** per 1 kg of body weight.
- **Natural hormones**, such as estrogens, which are still active in the human body in extremely low concentrations, are measured in **parts per trillion (ppt)** or even in **parts per quadrillion (ppq)**.

### **The ability of pesticide concentrations to cause damage in animal tissues**

In animal experiments, DDT, in concentrations of 3 ppm inhibits an essential enzyme in the heart muscle; and 5 ppm causes necrosis or disintegration of liver cells; 2.5 ppm of the closely related chemicals, dieldrin and chlordane, causes the same damage. From these examples, one can clearly see that, although the ppm or ppb pesticide residue levels seem miniscule, they may have a markedly negative impact on human health.

These few examples clearly confirm that even such infinitesimal concentrations as parts per million (ppm) and parts per billion (ppb) or even parts per quadrillion (ppq) can play an important role in human health /disease. Therefore we cannot ignore the dangers of weed killers or other chemical pesticides for human health, especially children and pregnant women, even if they appear in "extremely negligible" concentrations.

## **5.0 LACK OF BASIC DATA ON THE IMPACT OF PESTICIDE RESIDUES ON HUMAN HEALTH**

There is a **serious lack of information in medical textbooks and medical journals on the impact of chronic exposure to low concentrations of pesticide residues on human health.** In Canada there is no medical journal with an environmental health section that addresses issues particular to Canada.

As stated by World Wildlife Fund Canada in "The Problems with Pesticides in Canada", A Briefing Book for Parliamentarians:

- ***the "precautionary principle" is not used.*** Absence of data does not equal absence of effect. Assumptions have to be made about the potential for effect, rather than waiting for absolute proof of harm. Preventative, anticipatory measures need to be taken when the weight of evidence points to threat of harm to the environment, wildlife, or human health, even if some cause-and-effect relationships are not fully established. If a pesticide does not pose an unacceptable risk of harm, it must be registered. What about if the jury is out, or the weight of evidence indicates harm but there is no absolute proof? Then a precautionary decision needs to be made and this should be entrenched in legislation. This will be critical for both new product registration and re-evaluation;
- ***pesticides are assessed individually.*** The risks from multiple pesticide exposures should be considered in assessing the risks of any new pesticide;
- ***aggregate (total) exposure to pesticides is not considered.*** Registration of a pesticide for use on apples is undertaken without taking into account the same product's use on other foods, indoors, in gardens, etc. Under the US's new pesticide law, pesticides with a similar mode of action (e.g.: neurotoxins) have to be re-assessed as a group from all sources;
- ***formulants are not fully registered.*** Most of the toxicity data for a pesticide product is based on the "active ingredient". Formulants are considered "trade secrets" and are not disclosed on the label. Often called "inert ingredients", many are not inert at all. While some may be water, some may be solvents, surfactants or oils, which have toxic properties. Formulants should be subject to

the same assessment, review and access to information provisions as the "active ingredient";

- **vulnerable sub-populations are not adequately protected.** Pesticides are assessed based on the average adult male's exposure and sensitivity and on "indicator" species. Sometimes a 10-times safety factor is added. This overlooks the heightened vulnerability and exposures of children, key wildlife species, workers with above-average exposure, etc. New legislation should explicitly require protection of the most sensitive species considering a range of effects including poisoning, impairment of function, neurotoxicity and endocrine disruption;
- **information about pesticide hazards is kept secret.** The public is not allowed access to hazard information. While treated in Canada as "confidential business information" the same data is freely available in the US. The current "closed door" policy on pesticide data should be challenged and provisions for access to information must be clearly defined in legislation;
- **there is no requirement for (regular) review of registered pesticides.** The average registration date of the top 10 pesticides used in Ontario is 1961. There is no requirement for any regular re-evaluation, no health or environmental criteria for prompting reviews (e.g.: new information on effects), and no process or timeline for the few ad hoc "special reviews" undertaken;
- **post-registration monitoring is rare.** Neither the registrant nor the Pest Management Regulatory Agency (PMRA) are required to monitor for environmental contamination or impacts on non-target species. This is undertaken on an ad hoc basis, perhaps by the Canadian Wildlife Service or individual academic researchers, without any specific budget allocation. Without such data, reviews are very difficult to undertake. Proposed requirements for reporting of "adverse effects" will have to be carefully designed to ensure that all relevant information from all potential sources, not only registrants, is collected. Post-registration monitoring should be a condition of all registrations;
- **no data is collected or available on pesticides use.** Submission of pesticide use data (where, why, how, how much) should be a condition of registration;
- **the public has no formal opportunity for involvement in pesticide regulation.** Since there is no access to information, the public doesn't know which manufacturers are seeking approval for any particular pesticide(s) and can hardly be involved in the decision-making process;
- **non-chemical alternatives are not considered in the assessment of "merit and value".** Sweden uses the "substitution principle" as a central component of their risk reduction policy. According to it, hazardous chemicals can be replaced by less hazardous ones if the substitute is sufficiently effective, has more or less identical use patterns, does not cause significant economic or practical disadvantages for the user and is one class less hazardous than the chemical for which it is substituting.

## 6.0 PESTICIDES DAMAGING EFFECT ON THE OZONE LAYER

Methylbromide, a pesticide used to sterilize soil and kill insects in grain is a major threat to the ozone shield as documented in a report by the United Nations(16):

*Each bromine molecule in the stratosphere destroys 30 to 120 times more ozone than does the comparable chemical, chlorine. Thus methylbromide, which is released at levels comparable to CFC, is more potent in destroying the ozone than is CFC(16,17).*

It is expected that

- such depletion may finally eliminate most life in polar areas;
- it also will have a suppressing effect on the immune system of human beings. This is especially important now, when we see an increase of diseases related to the immune system such as AIDS, allergies, autoimmune diseases and cancer.

## 7.0 ADVANTAGES OF ALTERNATIVE PEST CONTROL STRATEGIES

There is evidence that an extension of organic farming would offer some clear advantages over conventional farming:

- although the initial output would be lower, the **environment** would benefit;
- **soil erosion** would be **reduced**;
- the impact of chemical pesticides on **human health** and **nature** would be eliminated.

Economic strategists should deal with the implications of pesticide policies in relation to the objectives of **society** as a whole as well as those of the farmer.

Ross Hume Hall, in the report of the Canadian Environmental Advisory Council entitled, A New Approach to Pest Control in Canada, writes(43):

*"The organic or nonchemical farming movement demonstrated that it is a viable alternative. It warrants significant support from the agriculture research and educational establishment."*

## **8.0 ALTERNATIVE PEST CONTROL – SOCIAL AND ECONOMIC IMPLICATIONS: REDUCING BIRTH DEFECTS, CANCER, AUTOIMMUNE DISEASES AND OTHER HEALTH PROBLEMS INCLUDING THE COST OF HEALTH CARE**

The number of birth defects and health problems, especially cancer, could be reduced by banning the cosmetic and other unnecessary uses of pesticides.

The prevention of even one or two abnormalities in every 1000 births would be a valuable achievement. It would also mean a considerable saving to society, since ultimately the taxpayers pay for the care, treatment and training of such individuals:

The social burden of such health problems can be more fully appreciated when one considers the impact of learning disabilities, other neuropsychiatric problems and birth defects on the daily lives of the affected individuals and our society. In Canada, over 200,000 children between the ages of five and fourteen are disabled and about 40 percent of these require special education. This number continues to increase.

Banning the use of toxic pesticides and other harmful chemicals in one part of the world is not sufficient because once a chemical is released into the environment, it can spread through the food chain and by wind, hurricanes, water, air and rainwater. Global air streams carry pesticides and other pollutants throughout the world thousands of miles from the original point of entry(18). Therefore action is needed both locally and globally to stop and reverse pollution.

## **9.0 RECOMMENDATIONS**

### Recommendation #1

### **Promoting and applying "NINE BASIC PRINCIPLES"**

To prevent the negative impact of weedkillers and other chemical pesticides on human health, especially the health of children and future generations, all decisions related to pesticides should be made applying the following nine basic principles:

#### **Principle # 1 The Precautionary Principle**

The "Precautionary Principle" is based on Principle 15 of the Rio Declaration on Environment and Development (Brazil 1992). This declaration endorsed the "Precautionary Principle" for the protection of the environment: *"when there are threats of serious or irreversible damage, **lack of conclusive, scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent degradation**".* The same precautionary principle should be applied when there is some evidence which points to a threat to human health. The lack of data does not equal the absence of possible harm.

Applying this principle, every pesticide should be assessed for the following impacts:

- assess the **impact of the active ingredients**;
- assess the **impact of formulants** or the "**inert**" ingredients;

Formulants are considered "trade secrets" and are not disclosed on labels. Some of the formulants may be even more toxic than the active ingredient. Formulants should be subjected to the same assessment procedure as the active ingredient;

- the **synergistic impacts** of the active ingredients, and "inert" ingredients;
- **the interactions with other pesticides with a similar mode of action** (for example neurotoxins). Under the recent U.S. government law, the pesticides having a similar activity should be assessed individually as well as a group, and all sources of such pesticides exposure should be taken into account when assessing the safety of the pesticides.
- The possible **pesticide breakdown products** of active and "inert" ingredients, formed by the metabolic processes of our bodies should be also assessed.

## Principle # 2 Networking

**Networking with governments, NGO's and other agencies and individuals, interested in the same goals.** Networking should involve the following areas: promoting physical, emotional and mental health; a sustainable healthy environment; and non-harmful alternatives to pesticides.

## Principle # 3 Education

The objective of education is to make everyone, including stakeholders and decision makers, fully aware that it is in **EVERYONE'S best interest to avoid using weedkillers and other chemical pesticides because pesticides are poisons** – they are deliberately made to kill or slowly destroy unwanted forms of life. Such education should stress.

- Nowadays everyone carries in his/her body a load of pesticides and other pollutants.
- Pesticides are made deliberately poisonous to destroy

undesired forms of life. Due to the basic similarity between humans and other forms of life at the cellular level and the movement of pesticides in the environment, it is impossible for anyone to completely avoid being contaminated by pesticides. The long term impact is not known; it depends on the interaction of many factors, known and unknown, and therefore it can not be predicted.

**Principle #4 Awareness/Action (A/A)**

**The "Awareness/Action" (A/A)** is based on the principle that every known or suspected **negative impact** of pesticides on human health or the environment should be **negated by the proper action**.

**Principle #5 Right to Know**

In addition to instructions for use, pesticide labels should describe all **active ingredients including formulants** ("inert" ingredients) and their known and suspected **impacts** on human health and the environment. (See Recommendation #5)

**Principle #6 Right to Choose**

**All municipalities should have the right to choose if they want to use spraying** of chemical pesticides or not. The **same principle** should be valid for the general public, tenants in apartment buildings, townhouses, etc. and people in the work place.

**Principle #7 Promoting Non-chemical Safe Approaches to Pest Control**

Promote widespread dissemination of alternative, safe, and non-chemical pest control measures and the research related to this topic

**Principle #8 Substitution**

Instead of substituting one chemical pesticide for another, "safer", chemical pesticide, we should replace this chemical pesticide by a non-chemical safe approach. Only in cases where such an approach would not be effective would a substitution of the chemical pesticide with another, safer, chemical pesticide be acceptable.

## Principle #9 Public Involvement in Pesticides Regulation and Use

The public should have proper **access to information** on the composition as well as the impacts of pesticides on human health and the environment as well as the right to be involved in the **registration and decision** making process. This principle is extremely important because neither the public nor the stakeholders and decision makers can escape the exposure to, and impact of, pesticides.

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### Recommendation #2

## An immediate ban on cosmetic and other unnecessary use of chemical pesticides

**Given the emerging data** on hormone disruption, carcinogenic, immunotoxic, neurotoxic, teratogenic, and other destructive impacts of chemical pesticides on human health, and the risk that they may cause multigenerational health damages, **we must immediately apply the "Precautionary Principle"**.

**To protect the health** of the Canadian population, especially children and pregnant women, it is necessary to place a ban **on the cosmetic and other unnecessary use of weed killers and other chemical pesticides** on lawns and gardens used by daycare centres, schools, hospitals, recreational and sports facilities, including parks and golf courses and other public places.

### Phasing Out

#### STAGE ONE

Introduce an immediate ban on the use of chemical pesticides in public places such as on municipal properties, daycare centres, schools, hospitals, nursing homes and adjacent areas. Chemical spraying should be allowed only as a last resort for temporary noxious weed control or if there is an infestation of insects which holds the risk of food contamination.

#### STAGE TWO

**Hormone disrupting and carcinogenic pesticides should be phased out as soon as possible.** There are approximately two dozen pesticides considered to be hormone disruptive, most of which are registered for use on food crops.

Recommendation #3

**Massive widespread education programs**

**National and Global Awareness/Action Programs**

**Widespread education programs should be prepared** in cooperation with the government, physicians, Public Health Associations, NGO's, educators, and individuals interested in pesticides, human health and the environment. These programs should place particular emphasis on:

- scientific documentation that, due to the **basic similarity at the cellular level between humans and other forms of life**, it is impossible to achieve target selectivity for pesticides and thereby avoid their **multigenerational, immunotoxic, neurotoxic, carcinogenic, and other damaging impacts**, especially on children and future generations;
- pesticides present serious threats for human health, especially that of pregnant women and those with weakened immunity;
- **alternative approaches** to chemical pesticide use and their
  - **health benefits** for both individuals and society as a whole
  - ability to **stop the "pesticides treadmill"**
  - maintain a sustainable and **healthy environment**
  - **economic benefits**, including a much reduced cost to the health care system
- the promotion of safe alternatives to chemical pesticides, such as;
  - organic lawn care and farming, hydroponic and xeriscape gardening, dutch white clover etc.
- the ability of pesticides such as methylbromide to cause **destruction of the ozone layer**.

Recommendation #4

**Alternative non-chemical pest control measures**

**Widespread dissemination of alternative safe non-chemical pest control measures** and research related to this topic.

Alternatives to chemical pesticides:

1. organic farming;

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2. hydroponic farming;
3. xeriscape gardening (a water efficient approach to landscaping that incorporates the use of native plant species);
4. use of ethnic approaches;
5. other approaches, such as dutch white clover .....
6. Integrated pest management control, if the use of chemical pesticides is absolutely necessary

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## Target Groups

### A. Physicians, Other Health Care Workers and Policy Makers

Presently there is severe lack of information in the medical literature on the health impact of chronic exposure to pesticide residues. Such a lack of information among medical professionals on this crucial public health issue reinforces the false impression that there is no special danger to human health from the use of weed killers and other chemical pesticides.

As of February, 2000, there was no Canadian medical journal that dealt with environmental health issues. Beginning in the spring of 2000, the Canadian Medical Association Journal happened to publish in one of the monthly issues an article related to the environment and health. In last few months, however, there has been no more such information and this information is still absent in medical textbooks as well as other medical journals.

*Suggested educational tools - A wall poster* (preferably incorporating a 2-3 year calendar, a scale for measuring childrens' heighths, and a **1-800** number for further information on alternatives to chemical pesticides. Such a poster along with **handouts** could serve as a means for educating the Canadian public (including physicians) on chemical pesticides, their impact on human health and the environment and possible alternative courses of action.

### B. General Population

Environmental Awareness/Action (A/A) educational exhibits using the latest audiovisual and museum technology to discourage home owners from using weedkillers and other chemical pesticides in homes and on private lawns.

### C. School Children

The provincial educational systems should include information on the health impact of chemical pesticides and other pollutants in the curriculum for health education, preferably in the form of a health education textbook. Because many values and life habits are formed at school age, ideally, a **standard health education textbook** should be made available to all Canadian students to ensure cost effective dissemination of this vital information.

Special projects such as a **Lawn Sign contest** on such topics as "*why we should not use pesticides on our lawns*" and "*love the dandelions and lady bugs*". These projects can be done

by children, with the assistance of adults. Such an approach may also help to change the frequently fixed attitudes of some parents, grandparents, and neighbours on the need for manicured lawns. It may be expected that they will stop using these toxic substances once they realize the ultimate price which may be paid for such a manicured appearance.

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**Recommendation #5****Right to know****Labeling**

Presently, **pesticides are exempt from Workplace Hazardous Materials Information Systems (WHMIS);**

Formulants, known as **"inert" ingredients, are currently not required to be registered.** The "inert" ingredient can often be more toxic than the active ingredient with which it is mixed.

- Product labels should disclose **all ingredients including formulants** or so-called "inert ingredients";
- Information about **known and suspected** acute, subacute and chronic **impacts** of active and "inert ingredients" on human health and the environment should be fully disclosed on the labels.

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**Recommendation #6****Municipalities and the general Public should have the Right to choose**

- All municipalities should have the right to choose if they want to spray with chemical pesticides or not.
- The same right should be given to tenants in apartment buildings, townhouses, etc. and people in the work place
- The public should have the right to choose the kind of food they wish to buy and consume. People should have the right to buy natural, pure, unadulterated foods grown without pesticides, non-irradiated, not genetically modified, without food colors or other food additives.
- Special areas in supermarkets, health food stores, etc., should display such foods and be regularly inspected to guarantee that the food complies with the claimed specifications.

The public should have the right of access to a pure water supply. Therefore, both availability and research into efficient water purifying household units should be promoted.

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**Recommendation #7****Restrictions of pesticide availability**

Any pesticide not fully documented to be safe for human health or the environment should be made available by **prescription only**.

The safety of pesticides for human health and the environment should be documented for both active as well as so-called inactive or "inert" ingredients.

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**Recommendation #8      Pesticides registration**

All nine basic principles, especially the Precautionary Approach, should be implemented when considering registration or reregistration of pesticides. When there are indications of health damage from the use of certain pesticides (for example, increased incidence of certain types of cancer in populations with high exposure to pesticide spraying such as manufacturers, farmers etc.) such a pesticide should be replaced by an alternative approach until it is proven to be safe.

## **10.0 CONCLUSION**

About fifty years ago, when pesticides were introduced, no one realized ***the basic similarities between humans and other forms of life at a cellular or subcellular level, or that movement of chemicals in the environment took place, resulting in their bioaccumulation and biomagnification.*** As a result, their hormone disruptive impact, immunotoxic, neurotoxic, carcinogenic and other cumulative multigenerational health damaging impacts as well as their impact on the ozone layer, were not known and not anticipated to be the cause of many of the health problems we are facing today.

The harmfulness of pesticides to humans was first recognized in those who were occupationally or accidentally exposed to such substances, and later in health problems experienced by the populations of third world countries. Only now have we started to realize that today, with the continuously increasing production of pesticides, we *all* carry deposits of pesticides along with other pollutants in our bodies. Perhaps most notably, our children are exposed to pesticides, even before they are born.

Pesticides, originally intended to kill or destroy undesired forms of life, either for economic or cosmetic reasons, now threaten our own health, the health of our children and the survival of future generations.

**We risk the continued existence of humanity, as we know it, if we continue the indiscriminate use of pesticides.**

The book "Our Stolen Future: Are we threatening our fertility, intelligence and survival?" by Theo Colborn, Ph.D, and his co-authors Dianne Dumanoski and John Peterson Myers, is based on the conclusions of over 4,000 scientific studies conducted by

more than 400 scientists – leaders in the fields of endocrinology, toxicology, cellular biology and medicine and from such institutes as the National Institutes of Environmental Health Sciences, research universities, the Environmental Protection Agency and medical research hospitals. The National Academy of Sciences consider these conclusions sufficiently serious to warrant a special study on the issue, The authors state:

*“Our activities no longer involve just one village and its neighbour, one valley or the next...”*

*“The scale of human activity means that these experiments engage the planet. As we race towards the future, we must never forget the fundamental reality of our situation: we are flying blind...”*

*“Our dilemma is like that of a plane hurtling through the fog without a map or instruments. Instead of being able to provide a reliable radar system, scientists are peering through the cockpit window trying to warn of any obstacles ahead. And usually, the most they can say is that the dark mass looming into view might be a cloudbank. Or then again, it might be a mountain...”*

*“So, what do we do? Land the plane as quickly as possible, slow down, or proceed full speed ahead because it would be incredibly expensive and disruptive to cancel this trip?”*

*“We need to redesign, not only lawns, food packaging and detergents, but also agriculture and industry. We need to find better and safer ways to meet basic human needs and create a future where our children can be born free of pesticide contamination. WE OWE that much, and much more to our children... – and to ourselves” (emphasis added)*

Canada has a unique opportunity to reverse this self-destructive trend and to establish itself as a leader of a new approach to pest control because we do not have a large pesticide manufacturing industry.

**The destiny of our children and the generations to come is dependent on your decision.**

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## APPENDIX 8

**A New Human Right to a Pollution Free Environment (United Nations);  
the Risk of Lawsuits**

In April 2001 the **United Nations (UN) Commission on Human Rights** proclaimed a new human right, *The Human Right to a Pollution Free Environment*. The proclamation states that **"Everyone has the right to live and die in a world free from toxic pollution and environmental degradation."**

Additionally, the UN proclaimed that, "It is time to recognize that those **who pollute or destroy the natural environment are not just committing a crime against nature, but are violating human rights as well.**"

Any official or official body acting contrary to these proclamations could attract criticism and charges for denying the right to a toxic or pollution free environment.

The scientific evidence on the serious impact of synthetic chemical pesticides on human health, especially on the health of children and the unborn, is rapidly growing. It is only a matter of time until class actions and individual lawsuits against those who are polluting the environment, including our water and food, will become the norm.

It is necessary to make everyone aware that a ban of synthetic chemical pesticides will benefit everyone. Pesticide spraying contributes markedly to environmental pollution. In today's world, *nobody* can escape the impact of pollution on his or her health, neither the pro-pesticide stakeholders.

It could be expected that with a widespread/mass education regarding the impact of pollution, including pesticide spraying on human health, combined with a newly enlightened self-interest, the risk of such lawsuits would quickly diminish.

We can also expect that such an approach would contribute to reducing the cost of our health care system.

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4. Solomon G. et Alias, Pesticides and Human Health – A Resource for Health Care Professionals, 2000
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6. CDC one in 1000 mosquitoes – New York Permeability BBB
7. Encephalitis one in 150
8. WNV encephalitis predisposition appendix
9. New York study Exposed not Aware
10. West Nile Virus Exposure not Aware
11. West Nile Virus Immunity
12. New York City 80 000 birds
13. The Cicero Study (See also Table 2c, page 8)
- 14.
15. Additional References

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- Appendix 1?** Retrospective softening of laboratory criteria.  
Difference between death with WN virus and death from WN virus  
(page 16 – Oct. 24, 03). (where is this appendix in the document?)
- Appendix 2?** West Nile neurological manifestations
- Appendix 3?** DEET
- Appendix 4?** The Multigenerational, Cumulative and Destructive Impacts of Pesticides on Human Health, Especially on the Physical, Emotional and Mental Development of Children and Future Generations – Canadian Government Responsibilities and Opportunities. A Submission to The House of Commons Standing Committee on Environment and Sustainable Development by Physicians and Scientists for a Healthy World, 2000
- Reference 5?** Larvicides
- Reference 6?** World Resources Institute – pesticides, the immune system, vis a vis the risk to public health
- Reference 7?** New York death of 80,000 birds
- Reference 8?** Cicero Study
- Appendix 9?** *Stop the Indiscriminate "Friendly Fire" of Pesticides Spraying.*  
An Open Letter by Concerned Physicians and Scientists, 2000
- Appendix 10?** *An Open Letter to the Quebec Government by Concerned Physicians and Scientists, regarding the harmfulness of pesticides spraying, 2001*  
  
*Overkill: Why Pesticide Spraying for West Nile Virus May Cause More Harm Than Good. A Report by Toxics Action Center and Maine Environmental Policy Institute, 2002*
- Appendix 11?** *West Nile Virus: A Primer for the Clinician (A Review).* Petersen L.R and Marfin A.A, Centers for Disease Control and Prevention, Ann. of Int. Med. Vol. 137. No 3, p.E-173 –179, August 6, 2002
- Appendix 12?** *The connection between a Softening of WNV Encephalitis Diagnostic Laboratory Criteria and a misleading sudden Increase of WNV Encephalitis Incidence*
- Appendix 13?** *Malathion*  
- **Fact Sheet on the Use of Malathion in Mosquito Control Program.**  
Health Canada's Pest Management Regulatory Agency (PMRA); 2001 edition; 2003 revised edition;

- *Malathion Studies from authoritative scientific literature*, Pressinger, R.W. and W. Sinclair, M.D. <http://www.nospray.org/studies.html>

*Malathion Malpractice: How New York's Mosquito-Spray*

*Campaign Spawned the Deadly Neurotoxin. The Village*

Voice Storage Issue, p.38, July 17, 2001

*Malathion Health Research.*

The Website sponsored by Chem-Tox.com

<http://www.chem-tox.com/malathion/research/index.htm>

*West Nile Virus and Insecticides.* J. Shankey, presented to the City of Ottawa April 2003, "Mosquitoes and Mosquito Repellents: A Clinician's Guide" *Annals of Internal Medicine*, 1 June 1998. 128:931-940.

**Appendix 14?** *Dragonflies, Goldfish and Other Ecologically Sound Mosquito Repellents*

**Appendix 15?** *Serious Consequences Including Three Cases of Death Attributed to DEET.*  
<http://www.acponline.org./journals/annals/01jun98/mosqutb4.htm>  
by American College of Physicians

**Appendix 16?** *UN Human Rights Commission – The New Human Right to Clean Environment. Legal Ramifications of Pesticide Spraying.*

Dr. Peterson, of the CDC, writes: "The timely identification of even a *single* (emphasis added) person with acute West Nile virus or other arboviral infection may have substantial public health implications and will probably augment the public health response to reduce the risk for additional human infections

West virus can be divided genetically into two lineages. Only viruses of lineage 1 have been definitely associated with human disease. The West Nile virus responsible for the 1999 outbreak in New York City was a lineage 1 virus that circulated in Israel from 1997 to 2000, suggesting viral importation into North America from the Middle East. Of interest, both birds and humans have died of West Nile virus infection only in the United States and Israel to date. The reason for this is not known. Since 1999, very few genetic changes have occurred in the variant of West Nile virus circulating in the United States.

There were close to 400 confirmed cases in the province last year and 17 people died. In Toronto alone there were 292 cases and 10 deaths. (Ottawa Citizen, April 10, 2003)

W-Five (files from Elaine Carey)

**Dr. Colin D'Cunha, Ontario's chief medical officer of health, said the province uses the national definition for confirmed and probable cases, which has been adopted by all provinces and territories. It is not dissimilar to the definition used by the Centers for Disease Control and Prevention in Atlanta, he said.**

**"I accept that the diagnosis is a changing one and the science is changing but there has to be an element of national and provincial consistency," D'Cunha said. He added that he encourages clinical doctors to tell the province about their disagreements with national definitions and those issues will be raised in federal-provincial forums.**

**New York City Department of Health, West Nile Virus:  
A Briefing, City Health Information, Vol. 19, No. 1, May 2000  
<http://www.ci.nyc.ny.us/html/doh/html/chi/chi.html>**

But familiarity breeds complacency. Take influenza, an illness that, like West Nile encephalitis, is seasonal, varies each year by region, spreads easily and is most likely to kill the elderly and the weak. People can take easy, concrete steps to avoid both: flu shots and good hygiene on one hand, long sleeves and mosquito repellent on the other.

Influenza kills more than 30,000 people each year in the United States, compared with fewer than 300 who died from the West Nile virus last year. Yet rarely does a flu outbreak inspire the kind of dread West Nile generates. People have so little fear of the flu that barely half of those who should get preventive shots each year actually do so.

It was naturally assumed that as the West Nile virus became more entrenched, it would spread around the country, and that each year would bring more cases than the last. This view is mistaken.

Most people who are infected never get sick, and, generally, every infected person becomes immune to the disease for life.

Does that mean that a large part of the United States population will be impervious to West Nile? "One way or another, we should take it seriously," said Dr. Petersen of the CDC. "West Nile is probably never going to be one of our leading public health threats.

But even if it continues like it is now, and the West Nile virus kills about 300 people a year, that is 300 people, and you cannot say that West Nile does not matter"

### End Notes

In a recent press release, the U.S.-based conservation group National Audubon Society reported that a study conducted by a New York state wildlife official found that although the virus was a factor in some deaths, the leading cause of death in over 80,000 birds examined for WNV was pesticide poisoning. National Audubon Society Press Release, « Audubon Learns Pesticide is Leading Cause of Bird Deaths in New York Audubon calls on Other States to Test for Pesticides. Release Date: June 22, 2001.

Since mosquitoes breed more quickly than their predators, repeated spraying is necessary, and long-term reduction in mosquito populations is difficult. That's why in cities such as Winnipeg, where there has been repeated annual spraying, mosquito infestations are legendary. Of course, the long-term human health damage of repeated spraying shows up only years later.

However even the use of adulticides is inefficient for controlling mosquitoes. It and may even increase mosquito populations by decimating the predators (such as dragonflies) lives that feed on larvae. XXX sankey

---

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2. Open Letter Quebec
3. Multigenerational Life Blueprint – Why not to Use Chemical Pesticides
4. Life Blueprint – Why not to Use Chemical Pesticides
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6. Court – Ont. Citizens
7. Transfer CDC
8. BBB
9. Appendix 8

## AN OPEN LETTER

From  
**CONCERNED PHYSICIANS AND SCIENTISTS**

June 2003

---

**West Nile Virus Encephalitis (WNVe)**

***THE MOST EFFECTIVE APPROACH TO PROTECTION***

***Why Pesticides May Increase Your Vulnerability to WNVe***

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- Appendix 2      *Multigenerational, Cumulative, Destructive Impact of Pesticides on Human Health, Especially on the Physical, Emotional and Mental Development of Children and Future Generations – Canadian Government Responsibilities and Opportunities - Report to the House of Commons Standing Committee on Environment and Sustainable Development (Physicians and Scientists for a Healthy World 2000)*
- Appendix 3      *Stop the Indiscriminate 'Friendly Fire' Pesticides Spraying Open Letter (Physicians and Scientists for a Healthy World, 2001)*
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- Appendix 5      *Overkill: Why Pesticide Spraying for West Nile Virus May Cause More Harm Than Good (Report by Toxics Action Center and Maine Environmental Policy Institute, 2002)*
- Appendix 6      *West Nile Virus: A Primer for the Clinician – A Review (Centers for Disease Control and Prevention, August 2002)*
- Appendix 7      *Malathion – Fact Sheet on the Use of Malathion in Mosquito Control Program. Health Canada's Pest Management Regulatory Agency (PMRA); 2001 edition; 2003 revised edition; Malathion Studies from authoritative Scientific Literature, (Pressinger, R.W. and W. Sinclair, M.D.; <http://www.nospray.org/studies.html>) Malathion Malpractice: How New York's Mosquito-Spray Campaign Spawned the Deadly Neurotoxin. (The Village Voice: Storage Issue, p.38, July 17, 2001) Malathion Health Research - (The Website sponsored by Chem-Tox.com: <http://chem-tox.com/> for Malathion the address is: <http://chem-tox.com/malathion/research/index.htm>) West Nile Virus and Insecticides (J. Sankey, Presented to the City of Ottawa; April 2003)*

- Appendix 8      *Dragonflies, goldfish and other ecologically sound mosquito repellents*
- Appendix 9      *Serious consequences including three cases of death attributed to DEET*
- Appendix 10     *Dragonflies, Goldfish and Other Ecologically Sound Mosquito Repellents (an overview)*
- Appendix 11     *Serious Consequences Including Three Cases of Death Attributed to DEET.*  
(<http://www.acponline.org./journals/annals/01jun98/mosqutb4.htm> by the American College of Physicians)

Table 7.24

**Symptom Rates in Malathion-Exposed Subjects**

<u>Symptom Class</u>	<u>Risk Ratio</u>	<u>% of Cases</u>
Head (headache, dizziness)	3.0**	73
GI	5.9**	59
Nose or throat	3.1	59
Sleep Problems	2.1	50
Abdominal (pain, nausea)	2.1	50
Energy	2.3	43
Eyes / vision	4.1*	41
Chest respiratory (chest pain, shortness of breath, cough)	2.7	38
Mouth / lips / teeth	2.6	36
Muscle / joint pain or neuropathy	2.4	33
Appetite	8.6**	32
Urinary	3.2	32
Skin / hair	2.7	27
Motor function	3.8	19
Heart rhythm (pound, skip)	14:0 (undefined)	14
Temperature (fever/chills) <sup>a</sup>	10:0 (undefined)	10
Genitals or sexual function	5:0 (undefined)	5

Source: Markowitz et al. (1986). \*p < 0.05. \*\*p < 0.01. <sup>a</sup> The context of fever and chills is extremely important in interpreting this finding. Fever and / or chills during infectious disease is arguably not disruption of thermoregulation, but rather a normal response. Increased fever and chills could, therefore, signal diminished resistance to infectious disease – not altered thermoregulation. On the other hand, unexplained fever, etc., might signal altered thermoregulation. Malathion-exposed seamen, evaluated days after exposure, experienced increased fever and chills, and there was no direct evidence to suggest that infection was present. Increased fever and chills could also result from susceptibility to occult, undiagnosed infection. Changes in immune function could be theorized to lead to such increased susceptibility, perhaps selectively to certain viral, parasitic, and intracellular bacterial infections that may relate to changes in T-helper cell cytokine profiles.

**Table 4. Reported Major Sign and Symptoms Attributed to Exposure to DEET\***

Affected area	Signs or Symptoms	Cases	Age	Sex	Concentration of DEET	Details of Use	Outcome	Reference
Central nervous system	Lethargy, confusion, acute manic psychosis	1	30 Yrs	M	Unknown	3 week, daily, whole body application, followed by 2 to 3 hours per day in a sauna	Resolved, no sequelae	65
	Lethargy, headaches, ataxia, disorientation	1	6 Yrs	F	15	>10 applications	Death (heterozygous for ornithine carbamoyl transferase deficiency)	66,67
	Acute encephalopathy	1	17mts	F	20	"Frequent" for 3 weeks	Death	68
	Headaches, disorientation, ataxia, convulsions	1	5 Yrs	F	10	Nightly for three months	Death	69
	Behavioural changes, confusion, tremors seizures, encephalopathy	101	8 Yrs or Younger 29 years	M n=6 F n=4 M	10-95	Concentration of DEET known in only 5 of 11 cases. Number of applications varied from 2 to 90. Many reports note "daily," "heavy," "frequent," or "whole-body" use	Resolved, no sequelae	63, 69-75
	Seizures, hypotension, coma	6	1-33 yrs	M n=4 F n=2	47.5 to 90	Ingested >50 ml of DEET	3 of 6 patients died	76,77
Cardiovascular	Bradycardia, hypotension	1	61 yrs	F	Unknown	'Liberal' application to all exposed skin before gardening	Resolved, no sequelae	78,79
Cutaneous or allergic reaction	Anaphylaxis	1	42 yrs	F	Unknown	Touched companion who had just applied DET insect repellent	Resolved, no sequelae	80
	Wheals	3	4 yrs 35 yrs	M n=2 F n=1	Unknown	Urticaria developed 10 to 30 minutes after application	Resolved	81-83
	Hemorrhagic bulla and erosions; confined to the antecubital fossa	11	18 - 20 yrs	M	33 - 50	Military personnel; applied to all exposed skin, then slept outdoors with repellent still on skin	Resolved in 9 of 11 patients; scarring in 2 of 11	84, 85

\*DEET= 4,4-diethyl-3-methylbenzamide

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<http://www.acponline.org/journals/annals/01jun98/mosqutb4.htm>

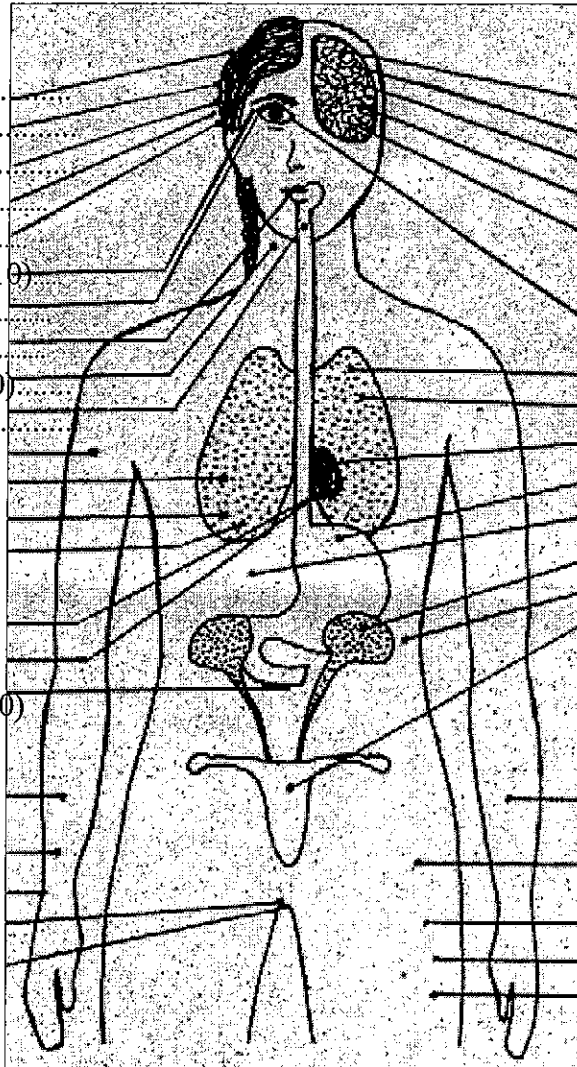
*Citizens for Alternatives to Pesticides (CAP)*

## EFFECTS OF CHEMICAL PESTICIDES ON HUMAN HEALTH

### Acute Health Effects

(occur soon after exposure)

Anxiety (2, 10) .....  
Coma (2, 10) .....  
Death (2, 10).....  
Dizziness & lethargy (2, 10).....  
Headache (2, 6, 10) .....  
Tremors of eyelids & tongue (2,10).....  
Impaired visual acuity (2,10).....  
Nausea & vomiting (2,6,10).....  
Irritation of mouth & throat (2,10).....  
Difficulty swallowing (2,10).....  
Fever (2,6).....  
Respiratory difficulty (2,10).....  
Bronchitis (6).....  
Chest Pain (2,10).....  
  
Slow pulse, even heart block (2,10)  
Fatal cardiac arrhythmia (5)  
Abdominal pain & cramps (2,6,10)  
  
(2,3,6)  
  
(6,9)  
Muscular tremors, even  
Convulsions (2,10).....  
Weakness, even temporary  
weakness & poor  
Paralysis (2,10).....  
arms & legs (2)  
Skin irritation & rash (2,6,10).....  
cancer, esp. Non-  
  
lymphoma (3,6,8,11)  
Loss of sphincter control (2, 10)  
Diarrhea (2,6,10).....  
suppression (1,3,6)



### Chronic Health Effects

(occur later or after prolonged exposure)

Stroke (1)  
Parkinson's Disease (3,6)  
Brain Cancer (3,6)  
Depression (6)  
Neurological problems  
*Poor concentration, chronic fatigue, irritability, insomnia (3,6)*  
Cataracts, blindness (1)  
Asthma-like attacks (6)  
Damage to lungs, incl cancer (3)  
High blood pressure (1)  
Damage to stomach, incl cancer (3)  
Damage to liver (2)  
Damage to kidneys, incl cancer (3)  
Tumors (9)  
Reproduction & sexuality effects:  
*birth defects, miscarriage, still birth,*  
*Premature birth*  
  
*Genetic mutation:*  
*loss of libido, male sterility (2,6)*  
*menstrual irregularity (1,6)*  
Nerve damage,  
co-ordination of  
Lymphoid tissue  
Hodgkin's  
Leukemia (3,6,7)  
Immune  
  
Environmental hypersensitivity  
(6,8)

### Please note:

1. Fetuses and young children (whose immune systems are immature) are especially vulnerable to the toxic effects of pesticides. Specifically, children tend to suffer from increased rates of behavioral and learning problems, and cancer (6,7,8). People with impaired immune systems are also especially at risk (8).
2. Many pesticides are excreted in mother's milk and can affect nursing babies (2,3). (This is not to imply that cow's milk is necessarily any safer for infants, however!)

3. Farm animals and pets are also at risk. One recent study showed a significant association between a cancer in dogs (canine malignant lymphoma) and owner's use of 2,4-D herbicides. The histology and epidemiology of this disease is similar to non-Hodgkins's lymphoma in humans (4).
4. Clearly, not *all* pesticides are associated with *all* these effects. (For example, herbicides cause some effects; insecticides, others.) For detailed data, contact CAP.

Sources:

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**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING  
WNV ENCEPHALITIS'**

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings

**West Nile Virus – It's unexpected spread  
In animals and people**

**A result of immunosuppression by pesticide exposure?**

- 
- 1999 – New York Malathion spraying – 11 million from 12 million killed
  - 2000 – How much spraying used and what was used, health legal consequences and cost
  - 2001 –
  - 2002 –
  - 2003 - none of NY pesticide companies accepted the offer to spray because of the fear to be sued by the public and need to pay money for health damage

**EXECUTIVE SUMMARY**

THE HEALTH STATUS OF OUR POPULATION IS DECLINING AND WILL CONTINUE TO DECLINE IF WE CONTINUE TO EXPOSE CANADIANS TO PESTICIDES. THOSE INDIVIDUALS WHO ARE MOST VULNERABLE IN THIS CHEMICAL WARFARE AGAINST MOSQUITOES INCLUDE CHILDREN, PREGNANT WOMEN, THE ELDERLY, CHEMICALLY SENSITIVE AND IMMUNOSUPPRESSED INDIVIDUALS SUCH AS PATIENTS WITH AIDS AND CANCER, AND PEOPLE SUFFERING WITH ASTHMA AND OTHER ALLERGIES.

THERE SHOULD BE A WIDESPREAD AWARENESS OF THE FAR-REACHING PUBLIC HEALTH, ECOLOGICAL, ENVIRONMENTAL, ECONOMIC AND LEGAL RAMIFICATIONS OF SUCH MASSIVE SPRAYING. THERE ARE OTHER, SAFER APPROACHES THAT CAN BE USED TO CONTROL AND PREVENT THE WEST NILE VIRUS ENCEPHALITIS.

THERE ARE SOME BASIC MISCONCEPTIONS WHICH WE WOULD LIKE TO CLARIFY:

**The Misconceptions & Facts**

- 
- 2. Pesticides being used are safe with minimum side effects and they have only mild side effects and are not toxic **Fact: The report by World Resources Institute presents scientific evidence that pesticide-related health problems are much more serious than is generally acknowledged, and that the steps now underway to resolve this issue are far from adequate.(15)**  
**(also make box)**
  - 1. Spraying pesticides is saving lives by reducing risk to be bitten bu infected mosquitoes . If spraying is not used wnv will spread and many more people will become sick . **Fact** Pesticides suppress Immune system and therefore increase vulnerability to develop WNV encephalitis as well as other infections to which one maybe other wise resistant.
- 

2.

---

**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING  
WNV ENCEPHALITIS'**

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings

3. WNV is a deadly virus and many people consider WNV as a deadly disease to which they cannot easily avoid because it is transmitted by mosquitoes – Fact\_ NO experience on this continent major epidemic except for AIDS except for polio no. The emerging diseases such as ebola. Anthrax or small pox. The name WNV encephalitis are making people anxious and terrified so that see this as another ... actually it is a much milder type of encephalitis which is here on this continent. Encephalitis due to WNV (5% of death from encephalitis is from WNV – the rest is due to other infectious agents) Person may have WNV blood test positive and unless confirmed by confirmatory test, it is only showing that they were in contact and have developed antibodies

- 
3. Unexpected number of people are getting ill from wnv
- 

**2003  
AN OPEN LETTER  
BY CONCERNED PHYSICIANS AND  
SCIENTISTS**

**Pesticides  
suppress  
Immune system  
and therefore  
increase  
vulnerability to  
develop WNV  
encephalitis**

We, the undersigned physicians and scientists, have a particular interest in the West Nile virus (WNV) and the impact of WNV and synthetic chemical pesticides on human health. We strongly believe that it is our moral responsibility as health professionals to help to clarify some widespread misconceptions with all those who are interested in WNV including the media, Canadian public and all decision makers to ensure that there is a proper widespread awareness and understanding of this important public health issue.

**MISCONCEPTION # 1**

There is a widely accepted erroneous belief that mass spraying of pesticides protects the population against mosquitoes and therefore will protect people against contracting WNV encephalitis. In reality, the opposite is true: the mass spraying will lead to deterioration of people's health. Ironically, such spraying is especially dangerous to those with impaired immunity for whose "protection" such spraying is mainly being done.

The exposure to pesticide spraying poses much more danger than the West Nile virus itself. Atlanta Disease Centre Control – PRESENT DEFINITION (check) Even people bitten by an

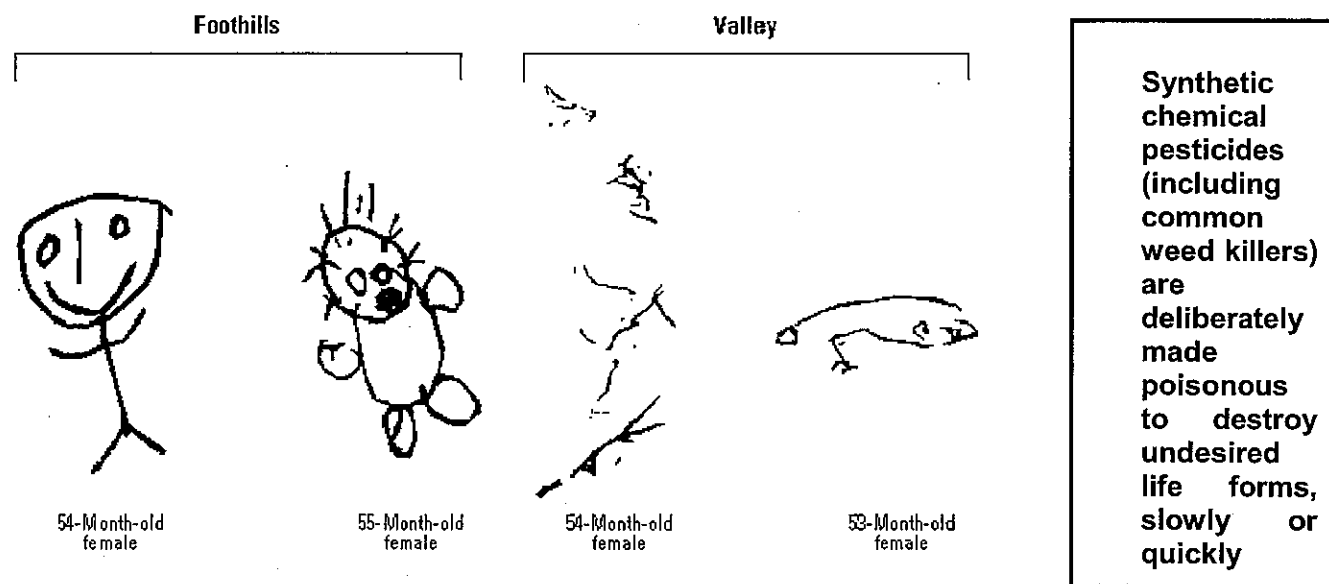
**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING WNV ENCEPHALITIS'**

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings

*INFECTED* female mosquito, the carrier of this virus, run very little risk of serious illness<sup>1</sup> unless they are immunosuppressed.

Additionally, repeated spraying fails to eradicate mosquitoes and actually leads to the survival of those mosquitoes resistant to pesticides. (Additional consequences) (easier transmission because of damage of intestinal tract, more vicious, more attacking) This resistance is passed on to new generations; leading to endless cycles of increased pesticide spraying each year – the "pest mill".

**Figure 1.** Representative drawings of a person by 4-year-old Yaqui children from the valley and foothills of Sonora, Mexico.

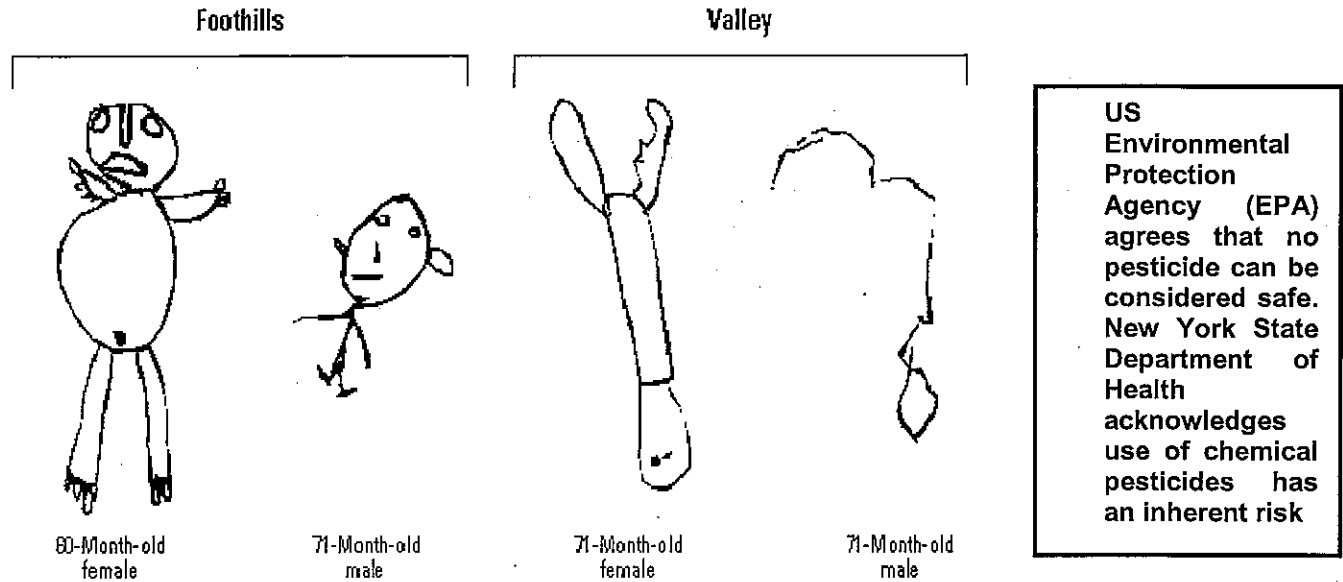


**Figure 2.** Representative drawings of a person by 5-year-old Yaqui children from the valley and foothills of Sonora Mexico.

**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING WNV ENCEPHALITIS'**

Attachment # 1  
Page 147 of 268

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings



- a positive test for WNV does not mean that such person has his/her health problems related to the WNV
- a positive test for WNV appears in many completely healthy individuals who were randomly tested for WNV; this virus can be transmitted from them only by blood transfusion through breast milk or body transplant

(widespread among people and animals; 1) changing of the definition/ blood testing results, interpretation 2) suppression of the immunity not limited to elderly 3) transfer through body fluids common in other viral diseases: AIDS, Hepatitis C, etc.

Conclusion: avoid pesticides, replace by natural approach, (catnip, need for education on the impact of pesticides) and how to strengthen the immune system.)

- 1) 80,000 birds ---Elaborate – in Ny they (look at article – small synopsis) (gochfeld and syracuse ) No documentation
- 2) statistics – how many die from WNV and how many from encephalitis – just 5 % from other types of encephalitis (Gochfeld – update by Atlanta)
- 3) Gochfeld – no documentation that spraying will be efficient in mosquito eradication
- 4) Syracuse – spraying 11 years, 15 fold more mosquitoes (put reference) (Gochfeld and Syracuse go to misconception # 1)
- 5) How many chemically sensitive persons – estimates between 6% - 15% growing every year - means at least four and a half million people across Canada (check latest data)
- 6) As opposed to the few deaths in people – how many Canadians were confirmed as having died from WNV (3 different tests are required to confirm that the death was from WNV)

## Why we need to stop the unnecessary use of pesticides

### Appendices

Attachment 7  
Page 148 of 268

1

**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING WNV ENCEPHALITIS'**

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings

Executive Summary from Multigenerational impact of pesticides on human health especially..... (Why we need a Moratorium on the Unnecessary use of pesticides) Use the text under this doc

#### Appendix

The role of extremely low concentrations of pesticides and commonly prescribed medication on human health/disease, especially children

(Down playing the Risk of pesticides ... Llbuse paper, put everything) put into appendix – Role of extremely... part per billion – show the train – what is part per 1 trillion –

contact Judy – significance of extremely low doses – speaker at Judy's conference – **Nicolas Ashford and Claudia Miller**

our bodies are composed – as of other life forms – from cells; we share the same life structural (in other words, cellular) and biochemical blueprint with other living forms including insects and fungus; therefore any synthetic chemical pesticide is also harmful to us

#### What is new

1) appearance in younger groups and in animals. And continuous spread of WNV in society. Why?

a) Even younger people may have suppressed immunity. Since the Open Letter of 2001 the basic points of this letter are still valid. The WNV encephalitis is basically affecting those whose immune system is suppressed. The immunosuppression has been recognized nowadays also in young people (mainly the effects of street drugs, certain types of prescribed medications, alcohol HIV positivity) and they been described in the literature patients with immunosuppression as it appears in AIDS patients and who have reduced CD4 cells (as it appears in AIDS patients)(**Reference**) but are HIV negative. There has been no reporting of assessment of immune status in those patients such as CD4, CD8, natural killer cells, B cells, gamma globulin level, immunoglobulins or HIV test.

b) Exposure of people and animals to pesticides - Information on the World Institute Report and the immunosuppression by pesticides. **The World Resources Institute's report (15) entitled "Pesticides and the Immune System: The Public Health Risks,"** documents the impact of widely used chemical pesticides on the immunity of animals as well as humans. Their conclusion, based on an extensive body of

**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING WNV ENCEPHALITIS'**

Because we share the basic life blueprint with other life forms. Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms – all of these pesticides are also harmful to human beings

experimental and epidemiological research from around the world is that:

**Impairment of the immune system by chemical pesticides can lead to allergies, autoimmune disorders such as lupus and cancer. It may also lead to infections to which one may be normally resistant.(9-15) In other words, exposure to spraying with chemical pesticides may actually increase the risk of developing**

The report by World Resources Institute presents scientific evidence that pesticide-related health problems are much more serious than is generally acknowledged, and that the steps now underway to resolve this issue are far from adequate.(15)

In 1999, to quell mosquitoes thought to be carrying West Nile Virus, New York City aerially sprayed Fyfanon ULV (malathion), a potential cancer-triggering pesticide. The NY State Department of Environmental Conservation has attributed a 1999 die-off of thousands of fish in Staten Island to malathion poisoning. The spraying campaign subsequently affected the Hudson River, Long Island Sound and the Great South Bay, and has been blamed for causing the largest extermination of lobsters. Roughly eleven million lobsters, 90 percent of the full population, perished. Connecticut and New York lobstermen sued the companies that manufacture and apply the pesticides used in spraying.

( 1) This also explains why there is so widespread WNV among animals in the nation and why the WNV does not follow in North America, the pattern described in outbreaks in other parts of the world i.e, one year outbreak, next year gone (because they have not been exposed to so many chemicals as people on this continent)

- c) Change of blood test evaluation is responsible for seemingly sudden increase in the incidence of WNV encephalitis (5% of cases WNV encephalitis) - in Jan 2003 Canada accepted the USA example and cancelled the confirmatory test for WNV encephalitis and accepted the first two tests as the sufficient confirmation for WNV encephalitis, so what used to be called 'probably WNV' is now being called 'positive'. Obviously this would cause an increased number of WNV encephalitis cases and increased public anxiety,

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risk of further spraying (as you mentioned previously - mainly to give the impression that something is being actively done) and weakening of the immune system - leading to increased vulnerability to develop WNV encephalitis, etc. Should we not return to the previous rigorous assessment

?Your comments please. ((Gochfeld) Television Ctv #13 interview with Winnipeg)

2) The virus is not transmitted from person to person directly, but a new finding is it may be transmitted through the infected body fluids similar to AIDS patients. In other words, it can be transmitted through blood transfusion, intrauterine, by breast-feeding, and organ transplants (not surprising since the same mechanism of transmission is seen in AIDS).

#### Malathion

(enclose appendix, description from Health Canada and EPA, stress damages the paint of the cars in high concentrations)

US Congress, Office of Technology Assessment (OTA) released an extensive report entitled "Neurotoxicity: Identifying and Controlling Poisons of the Nervous System."(16) The two top targets of the report are chemical pesticides and pharmaceutical drugs. The OTA report expresses concern that research projects have not adequately addressed neurotoxicity of these substances – a major issue for the survival of humanity, as we know it:

"... very few new and existing chemicals have been evaluated specifically for neurotoxicity. Of particular concern are the delayed effects of some of the organophosphate pesticides. Organophosphate and carbamate insecticides are the most common causes of agricultural poisonings. Malathion, an organophosphate pesticide, can permanently damage the nervous system after only one exposure."(16)

Legal cases: Request of those who are suing the govt - misguided- quote  
As mentioned previously - World Institute

This lack of understanding of the impact of pollution on human health contamination underscores the need of widespread education on the impact of pesticides and other pollutants on human health. The urgent need

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It is absolutely necessary to make the public and decision makers aware that:

- a positive test for WNV does not mean that such person has his/her health problems related to the WNV
- a positive test for WNV appears in an overwhelming majority of people randomly tested for WNV and that these individuals were staying completely healthy
- pesticide spraying makes people more vulnerable to WNV encephalitis and other commonly insignificant infections.

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*In view of the evidence that:*

- *we share the basic structural and biochemical life blueprint with ALL other life forms, including weeds, mosquitoes and other insects (see enclosed background information);*
  - *ANY chemical pesticide leads to a quick or slow damage of the basic structural unit I., e. cell -- or biochemical processes of such undesired life forms such as weeds, mosquitoes or other insects etc.*
  - *because chemicals cannot be confined to the area where they were released,*
- *any further expenditure related to testing or retesting of chem.*
- *ical pesticides is futile , therefore, is a waste of time and money.*

*All chemical pesticides used for unnecessary reasons (such as esthetic appearances of landscapes) must be banned.*

Health officials in New York have already announced they budgeted over \$200 million to continue the spraying in future years. This offer was refused by the pesticide producers because New York City did not agree to cover the future legal expenses against the pesticide suppliers from those who develop health problems after mass spraying.

<http://www.cfe.cornell.edu/erap/WNV/>

Pesticide spraying

Even a single exposure to pesticides can trigger (5-31,34-38):

*latent environmental sensitivities*

*allergies*

*chronic fatigue syndrome*

*behavioral changes such as irritability, anxiety, depression, aggressiveness and personality changes*

*concentration difficulties, memory and learning problems*

*hormone disruption*

*erectile dysfunction*

*loss of libido*

*other health problems.*

**'THE EXPOSURE TO PESTICIDES IS MORE RISKY THAN THE RISK OF CONTRACTING**

**WNV ENCEPHALITIS'**

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**Latest News - as of February 28, 2003**

Doctors Suspect Much Higher Human Case Count in Canada in 2002

**2003 \_ why this west nile virus cases do not follow the established pattern ?**

What were the results of the immune system of those who contracted the Wnv encephalitis

What were their CD4, CD8, Natural Killer cells (CDE16+ 56) plus levels of gamma globulin

Why there was nothing mentioned last year in the statistics of the WNV appearance.9CHANGE OF DEFINITION FOR WNV ENCEPHALITIS

What is the connection with increasing amount of pesticides we had our children are exposed to. This should go to Napke and Cushman Why the wnv does not follow the pattern as expected ?

Why patients in Boston hospital developed flaccid paralysis ?

Why wnv affects so many animals and why is it so widespread ?

The answer is further suppression of peoples immune systems(as well as of animals)with

The report by World Resources Institute presents scientific evidence that pesticide-related health problems are much more serious than is generally acknowledged, and that the steps now underway to resolve this issue are far from adequate.(15)

In April 1990, the Office of Technology Assessment (OTA) of the US Congress released an extensive report entitled "Neurotoxicity: Identifying and Controlling Poisons of the Nervous System."(16) The two top targets of the report are chemical pesticides and pharmaceutical drugs. The OTA report expresses concern that research projects have not adequately addressed neurotoxicity of these substances – a major issue for the survival of humanity, as we know it:

"... very few new and existing chemicals have been evaluated specifically for neurotoxicity. Of particular concern are the delayed effects of some of the organophosphate pesticides. Organophosphate and carbamate insecticides are the most common causes of agricultural poisonings. Malathion, an organophosphate pesticide, can permanently damage the nervous system after only one exposure."(16)

ALL LIFE FORMS INCLUDING HUMANS ARE VULNERABLE TO TOXIC EFFECTS OF PESTICIDES.

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It is estimated that 6 to 15 percent of the population is chemically sensitive. If only 10 percent of a 10 million population would be chemically sensitive, the number of people potentially affected by chemical pesticides, such as Anvil 10+10 and Scourge, (which have a tendency to cause allergies and neurological problems), could reach 1 million people.

To this 1 million potentially affected people must be added an additional unknown number of elderly, those with impaired immunity (patients with AIDS, cancer, etc) and children as well as future offspring of pregnant women; and those who may become sensitized. These affected people may develop immediate and/or delayed adverse reactions ranging from mild to life threatening

Considering the cumulative, multigenerational, and destructive impact of pesticides, especially on children's development and behavior, it is frightening to imagine the delayed consequences of repeated pesticide spraying. These consequences will especially serious for those with allergies or weakened immune systems, cancer, those who are chemically sensitive, as well as for children and future generations.(6-16, 18-31, 34-38)

#### SAFE APPROACH

Dr. Gochfeld, U.S. Professor of Environmental and Community Medicine, states, (Appendix A) "We should consider the disease itself and the risk to the human population...seven deaths in a population of over 10 million people over a one year period is certainly tragic, but pales beside the number of deaths from many other diseases that are addressed less aggressively."

#### Recommendations:

It is urgent to educate the general public, media and decision makers that:

- chemical pesticides, including those used to prevent West Nile Virus encephalitis in New York, cause much more health damage and are much more harmful to public health than the extremely small health risk presented by West Nile Virus.
- the West Nile Virus is carried by birds and spread by mosquitoes, and is not an especially dangerous disease. The only vulnerable people are those who have reduced immunity – they are much more susceptible to *any* infection, exotic or not.

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- ultimately, no one can avoid exposure to those pesticides. We all breathe the same air and live on the same planet.
- there are safe approaches that can be used to control and prevent West Nile Virus encephalitis.

A combination of the dramatic response in the media, lack of experiences of present generations of North American health professionals and educators with epidemics other than AIDS, undoubtedly have contributed to the over-blown and fearful response to this relatively insignificant virus. (**Lack of knowledge on the impact of pesticides among physicians**) As mentioned previously, thousands of people carrying antibodies against West Nile Virus never experienced any kind of symptoms although they were exposed to it.

the indiscriminate mosquito spraying must be stopped and the unnecessary use of chemical pesticides needs to be abandoned and outlawed. Such an action will benefit EVERYONE including all stakeholders and their families – we all breathe the same air, and live on the same planet ...

They themselves cannot escape the prostate cancer, nor can their mothers, wives and daughters escape breast cancer. Actually, it is well documented that their own children may be even more affected by pesticides than are the children from other social classes.

For example, the incidence of leukemia has been found to be 6-7 times higher in children from higher economic social classes apparently because their parents can afford to hire gardeners to beautify (with chemical pesticides) lawns and gardens where these children are playing. It may be useful to obtain additional information 1-888-939-3333 on the incidences of cancers such as brain tumors, lymphomas or cancer of the testicle in different social classes. Long before the introduction of chemical pesticides beautiful lawns and gardens existed - when children were not falling ill and dying from exposure to "nature."

Most of the officials making the decisions about WNV prevention are not physicians and a combination of the factors such as lack of education

THE VIRUS IS NOT TRANSMITTED FROM PERSON TO PERSON.(2-4)

The West Nile Virus is transmitted to humans by mosquitoes, not from person to person.(2-4) Female mosquitoes acquire the virus when biting an infected bird. The virus must be repeatedly transferred back and forth between infected mosquitoes and animal reservoirs (usually birds) before it poses a risk to humans.(2-4)

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*INEFFICACY OF PESTICIDE SPRAYING*

1. Info from Syracuse
2. 80,00 birds

3. The discovery in September 1999 that new viral encephalitis had appeared in the New York Metropolitan area, fostered a media campaign as well as some ill-advised control efforts.

West Nile Virus belongs to a large group of arthropod-borne viruses (nicknamed ARBO viruses) which includes many viruses that cause more familiar forms of encephalitis as well as dengue fever and yellow fever.° (g-A)

4. It is clear that there is something particularly terrifying about encephalitis that conjures up more frightful images than other more common infectious diseases, such as influenza, which each year kills more people than does encephalitis. Thus it is easy to understand why the arrival of this West Nile-like virus caused such consternation and alarm in the media and the public. Particularly fearsome was the prospect that infected birds would soon be migrating and spreading the virus.

6. As do other virus, ARBO viruses require a host, in which to live. The primary hosts for the virus are referred to as reservoirs. Viruses are sometimes spread from host to host by other animals, which are then referred to as vectors.

For West Nile Virus, mosquitoes are the vectors and birds are the primary hosts, while humans are an alternate host. In areas such as Africa, where the virus has occurred for years, most bird species have developed resistance to the virus through the selective elimination of susceptible individuals and the survival of those who could resist the infection. This evolutionary process is similar to the process by which mosquito populations build up resistance to pesticides, or by which bacteria develop resistance to antibiotics.° (g-A)

It is relatively difficult to contract an ARBO virus disease. These diseases are not spread directly from person to person. Rather, a person has to be bitten by an arthropod (usually a mosquito) that has recently bitten an infected animal in whose blood the virus was already circulating.

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Based upon experience with other West Nile Virus epidemics, we know that typically less than one tenth of one percent of people bitten by infected mosquitoes develop any clinical signs of disease, and of those who do develop disease symptoms most do not develop the serious encephalitis manifestations. However, up to 10% of those who actually develop encephalitis may die of the disease.<sup>o</sup> (g-A)

11. It is easier to make a house mosquito-proof than spray proof. Indeed, it is well-established that outdoor air pollutants tend to accumulate at higher levels indoors than out.

New Jersey has extensive experience in conducting surveillance programs for viral encephalitis, including the strategic placing of sentinel (and therefore rejected to follow the example of New York and refused the spraying) chickens in cages in area where mosquitoes are prevalent. The chickens are then regularly tested for virus activity. This surveillance program successfully reduced human and equine infection by Easter equine encephalitis and St. Louis encephalitis even though these viruses continued to be active in bird populations reduces breeding areas in proximity to human activities, introduces natural predators to keep mosquito populations in check and uses judicious spot-applications of larvicides. Spraying to control adult mosquitoes is considered a last resort to be used only when local infestations become a serious nuisance or health threat.

12. The only human epidemic of West Nile Virus infection that has been well studied occurred in Romania in the late summer of 1996. The U.S. Centers for Disease Control and Prevention, certainly the premier infectious disease control agency in the world, assisted in the evaluation and control of that epidemic and recently published a report in The Lancet, the leading British medical journal.

In that epidemic an estimated 94,000 people were infected by the virus, of whom about 400 developed clinically apparent encephalitis confirmed by virological studies. Fifteen of those people, almost all over the age of 65, died. Thus, even if one is bitten by an infected mosquito, the risk of suffering disease is very low and the risk of dying much lower. Moreover, in Africa where West Nile Virus has been recognized for more than sixty years and where it is widespread, there have been very few human epidemics. In

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fact, West Nile Virus infection is characterized by its sporadic outbreak in humans, even in areas where it is endemic in birds. This is likewise true of related infections, such as St. Louis encephalitis and Eastern equine encephalitis, where 30 or more years may pass between human outbreaks. Knowledge of these numbers is crucial in assessing the risk-risk tradeoffs essential to public health decisions in this area.

13. pesticide spraying can reduce local outbreaks of mosquitoes temporarily, but populations recover quickly and over the long term pesticide-resistance emerges. The well-established public health techniques for preventing exposure to mosquito-borne diseases include eliminating mosquito breeding places or treating them to eliminate the larval mosquitoes, the use of screens or netting in homes, the use of mosquito repellants, reducing exposed areas of the body and reducing activities that expose people to mosquitoes. The use of pesticides to eliminate adult mosquitoes is a last resort and should be used only as an interim measure when and where there are large infestations of mosquitoes in close proximity to human populations. ° (g-A)

Despite these recommendations from the Centers for Disease Control and the World Health Organization, widespread spraying (termed "broadcast" spraying) was conducted in the New York metropolitan area -- even at a time when mosquito populations were declining naturally due to cool weather. Pesticide advocates asserted, incorrectly, that the pesticides used were innocuous to humans and pets and ignored outcries about the harm to non-target species. ° (g-A)

Experts in environmental medicine at our Environmental and Occupational Health Sciences Institute concluded that the media coverage of deaths and spraying actually distracted the public from these effective measures and created the mistaken impression that broadcast spraying was the first choice, the preferred effective solution to West Nile Virus disease, and the only thing that needed to be done ignoring the rather significant risks of broadcast pesticide spraying not only to humans but to non-target species that are of economic, aesthetic and ecological importance. Moreover, the investment in spraying diverted scarce funds from other public health problems.

14. However, in a city such epidemic plus other diseases

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15. Organophosphates such as malathion and pyrethroids (both used for spraying, malathion in 1999 and pyrethroids in 2000) reduce the activity of the enzyme acetylcholinesterase which is essential for normal nervous system function.

This is the mode of action by which these pesticides kill insects and harm humans. For example, malathion is in the same class of chemicals as the nerve gases such as sarin, and workers who produce malathion or blend it into final products as well as those who apply it, if not well-protected, can suffer agitation, sleep difficulty and weakness, as well as anxiety, forgetfulness, depression and activity of the enzyme acetylcholinesterase which is essential for normal nervous system function.

Pesticides, even those with relatively low acute toxicity to adults may be more problematic in young children, with immature nervous systems, and in the elderly. It is also a problem for those who have, or believe that they have, unusual sensitivities to pesticides or other chemicals.

i) in broadcast application most of the spray falls on areas where the likelihood of mosquito-human contact is low. Thus areas with few mosquitoes but many other non-target species are sprayed, as are densely populated residential areas where mosquito populations are low to begin with. 2) It is not made clear to the public that these broad-spectrum insecticides kill many other insects besides mosquitoes. These include economically valuable insects such as honeybees, and ladybird beetles insects that are important components of biodiversity and are the food for birds and small mammals.

3.

Indiscriminate pesticide spraying over an urban area is an ineffective and very dangerous attempt at controlling mosquitoes, and thereby controlling the West Nile Virus.(2-4)

## Future Needs

Intensive education on pesticides harmfulness and that exposure to pesticides makes people immunosuppressed and they increase the impact of WNV and the risk of developing the illness

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According to the year 2000? (please check for reference from Open Letter to New York) the data from Centres for Disease Control CDC Atlanta

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- 1 As reported by the Centers for Disease Control (CDC), Atlanta, the chances of a mosquito bite resulting in West Nile Virus infection and serious illness is extremely low.(2)
- The *Question and Answer Bulletin* of the New York City Department of Health advises that, "very few mosquitoes -- perhaps only one out of 1,000 -- are infected. Even if you are bitten by an INFECTED female mosquito, your chances of developing illness are very small."(3)
- Dr. Gochfeld, Prof. of Environmental and Community Medicine at the Robert Wood Johnson Medical School and School of Public Health reports(4) that, based upon his experience and other West Nile Virus epidemics, typically less than one tenth of one percent of people bitten by *infected* mosquitoes develop any clinical signs of disease; **in other words less than one in 1000 persons bitten by INFECTED mosquitoes (see Appendix "A")** will develop some health problem.
- Even those who developed West Nile Virus related illness, usually only have mild forms with headaches, muscles aches, skin rashes and swollen lymphatic glands. More serious infections may cause headaches with high fever.(2-4)
- It is extremely rare for a person to develop encephalitis.(2-4) Available information indicates that those who developed West Nile Virus encephalitis in the year 1999 (62 people, 7 died) and in the year 2000 (21 people, 2 died) were elderly and immunosuppressed. These people were residents of New York City and the surrounding areas. One person was a Canadian visiting New York.
- Pesticides suppress the immune system and therefore increase the vulnerability to develop WNV encephalitis and other commonly insignificant infections; they also increase our risk to develop non-Hodgkin's lymphoma, leukemia and other type of cancers
- synthetic chemical pesticides (including common weed killers) are deliberately made poisonous to destroy life slowly or quickly
- **our bodies are composed – as of other life forms – from cells; we share the same life structural (in other words, cellular) and biochemical blueprint with other living forms including insects and fungus; therefore any synthetic chemical pesticide is also harmful to us**

(for box)

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- US Environmental Protection Agency (EPA) agrees that no pesticide can be considered safe. New York State Department of Health acknowledges use of chemical pesticides has an inherent risk
- **because we share the basic life blueprint with other life forms, all synthetic chemical pesticides (including common weed killers) are also poisonous to us; therefore re-evaluation of these toxic substances for non-essential purposes is futile and is a waste of time, money and resources.**

**United Nations Human Rights Commission April - the right to live and die in an uncontaminated environment and to pollute an environment is criminal**

**As explained Because we share the basic life blueprint with other life forms. Synthetic Chemical Pesticides are deliberately made poisonous to destroy quickly or slowly the undesired life forms therefore -all of these pesticides are also harmful to us – human beings: especially to children's physical and mental development**

**Everyone carries in their body tissues hundreds of foreign chemicals including pesticides known and unknown and the final impact is dependant on many factors known and unknown**

## CHAPTER 8

### A 21ST CENTURY TRAVESTY NEW YORK CITY CHEMICAL PESTICIDE SPRAYING<sup>79a,b</sup> What Do You Need to Know to Protect Your Home Town?<sup>1, 2, 5a, 19a, 64, 78, 79, 84, 85, 92</sup>

Politicians in many cities make decisions, which can directly impact your future, personal health and welfare. Because of misunderstandings, poor communication and a lack of unbiased information, some decisions made by your politicians and health officials are not always prudent. It is also sometimes possible for those who have been given the position to serve, honor and protect to have vested interests that can sway their choices. At times you may have to critically look at who stands to gain from local and city health decisions. You can be given reasons that appear to be sound and responsible, but these may not always be the *real* reasons. There are those who rationalize their actions as a way to "prevent panic", but when your present and future health are at stake, you should have the right to be fully informed. Repeated reassurances that "all is safe" does not make it true. At times, you may not be informed at all. Your best recourse is for you personally to become more aware of the pros and cons of issues that impact your health and the lives of your loved ones. One good example of this is the repeated spraying of toxic malathion over a city to decrease the chances of a non-existent epidemic.

This chapter discusses the issues related to New York City's (NYC) 1999 to 2001 extensive and repeated chemical spraying to prevent encephalitis from the West Nile virus. The possible harmful health effects of this decision are potentially far greater than most would ever imagine, not from encephalitis, but from the malathion and other toxic chemicals that were used. As others have pointed out, the real epidemic is not the West Nile Virus, but the

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many illnesses the chemical exposures to handle the problem can potentially cause. The West Nile viral disease, in general, in the past has been a mild illness.<sup>64,79, 80</sup> Was the chemical spraying a tragic example of extremely poor judgment? In time we shall find out. What occurred there demonstrates how easily this same situation could happen in your hometown since many cities are being or have been sprayed with the same or similar types of toxic chemicals and the residents are often misinformed, partially informed and, at times, not informed at all.

To add to the repeated chemical poisoning, New Yorkers were also exposed to the monumental amount of pollution associated with September 11, 2001 tragedy. This can greatly compound the immediate and potential long term, serious health concerns for all who were exposed.

### **Pesticide Spraying to Kill Insects<sup>65</sup>**

It is impossible to fully comprehend the health and economic splatter effect on humans, wildlife and the environment due to the spraying of the New York City area. The major chemicals sprayed over a two-year period included the organophosphate, malathion, and other toxic chemicals, such as the synthetic pyrethroids combined with piperonyl butoxide.<sup>3a, 5a,b, 84</sup> At the same time as the New Yorkers were sprayed, many of those who live along the east coast were similarly sprayed with these same toxic chemicals. This chapter will give you some needed information so you can decide if the use of malathion, in particular, was potentially worse than the disease for which it was used to prevent.

If the aim was to kill the adult mosquitoes with spray, this treatment would be considered to be highly ineffective.<sup>24b</sup> The chances of enough spray actually hitting and killing a mosquito was negligible. It is estimated that for every million drops of

pesticide spray only one would land on a mosquito, and it takes two to three drops to kill a mosquito.<sup>3a</sup> Humans realistically were much more apt to be hit or hurt with the spray. When malathion was used to diminish the mosquito breeding grounds, it made more sense but there certainly are known safer and better ways to control the mosquito population.<sup>71a</sup> We must ask why anyone would even consider the use of toxic chemicals that are potentially harmful to humans, wildlife, birds, fish, amphibians and plants when safer, more effective forms of preventing insect-related health problems are available.<sup>65</sup> In time, the full extent of the impact of the medical decisions made in NYC and in other areas of the country will gradually become apparent to many who presently have no idea why they are ill. Some will never know. The information in this chapter will enable you to anticipate and be better prepared if the air you breathe is destined for "legislated pollution". (*If you have already been sprayed and are ill, chapter 3 explains how you can possibly recognize and confirm the diagnosis and find appropriate treatment.*)

### **What Are Some Reasons for Concern<sup>19a</sup>**

Organophosphates such as malathion can be poison. Documents released in a lawsuit in 1996 against the manufacturer reported that high temperatures caused malathion to break down to an even more toxic substance called isomalathion or malaoxin. This chemical is 40 times more toxic than malathion.<sup>2, 3a-e, 4a, 5a,b</sup>

Reports state this pesticide, used over NYC, was stored improperly and at temperatures that were excessive allowing malaoxin to form before the spray was applied.<sup>19</sup> The EPA also required Cheminova to provide information to users of malathion (Fyfanon) not to spray it over bodies of water, near foods, directly on people or in places where humans would return within 12 hours. Reports state that many of these suggested rules were broken when

the NYC areas and people were sprayed.

*(It is of interest to know that in October 2002 the EPA changed the rules to stem the rapid spread of the West Nile virus. It is now easier to spray over water with toxic substances to kill mosquitoes without a permit as previously required by the Clean Water Act.<sup>13, 80</sup> It appears to be possible to make exceptions to laws that were specifically designed to protect the public.)*

Later on, pyrethroid products such as Scrouge and Anvil 10+ 10® were also used to control the mosquitoes in the NYC area. These pyrethroids mimic estrogens and are reported to cause breast cancer in females, decreased sperm counts in males and possibly brain tumors in children.<sup>5b, 65</sup>

In addition, malathion and the above formulations typically contain some solvents in the form of xylene, benzene or toluene.<sup>2</sup> Even though these are known to be exceedingly toxic and are registered poisons, they do *not* have to be specified on the Material Safety Data Sheets.<sup>5a</sup> They can be legally included in a deceptive lump category referred to as "inert" ingredients.<sup>5b, 19</sup> *(For more details see Chapters 1, 6, 7 and 10.)*

### **What Are the Known Acute and Chronic Symptoms from Malathion Exposures?** <sup>1, 2, 4a, 6, 19a, 101</sup>

The initial complaints after exposure to malathion spray are typically the sudden onset of a prolonged flu-like illness, an upper respiratory infection or breathing problems such as coughing and asthma. How many who were exposed, however, are also aware that this chemical is known to cause the array of symptoms found in Table 9A?<sup>19a</sup>

Table 8A

### **Possible Symptoms from Malathion or Pesticides**

- Insomnia
- Fatigue
- Headaches
- Blurred vision
- Myopia (near-sightedness)<sup>106</sup>
- Watery and burning eyes
- Skin irritation
- Nausea
- Excessive mucus
- A bad taste in the mouth
- Loss of memory
- Loss of coordination
- Loss of hair
- Weakness
- Twitching
- Sexual dysfunction
- Small pupils
- Dizziness
- Increased salivation
- Changes in heart beat
- Increased urination
- Diarrhea
- Hemorrhages
- Anxiety
- Pain
- Tingling in fingertips
- Convulsions
- Depression
- Encephalitis<sup>70</sup>
- Testicular atrophy

- Stomach ulcers

No, not every symptom or all individuals will be affected, but all these medical conditions can and do arise in some individuals after exposure to organophosphate chemicals, such as malathion.

Although the above medical complaints tend to occur 3 to 15 days after exposure, those who have been sensitized to chemicals can become ill in seconds from merely walking outside and breathing air contaminated with chemicals such as pesticides. Headaches, difficulty thinking clearly and problems walking can quickly become evident. After one significant exposure, such symptoms might last hours to days but for a few, the harmful effects last for months or possibly a lifetime. For many, from then on, *future minute exposures to different unrelated chemicals can cause symptoms similar to those that were originally experienced.* This is called the spreading phenomenon. (See Chapter 1, 8 and 10 for more information.)

### **What about the Other Sprayed Pesticide Chemicals or Ingredients?** <sup>5a, 7, 19 a,c,d, 30a</sup>

Pyrethrums and synthetic pyrethroids, such as those used on Staten Island, included Anvil 10+ 10® (sumithrin) and Scrouge (resmethrin). These have been associated with increased respiratory illness, asthma, burning of the eyes, nose and skin, increased saliva, an increased sensitivity to sound and touch, lowered sperm counts, sexual difficulties, thyroid damage, miscarriages, pre-term deliveries and toxic damage to the liver, kidneys, intestines, skin and nervous system. <sup>1, 2, 5a,b, 6, 19</sup>

Some of the other chemicals used also are suspect causes of cancer in the breast, prostate and brain.<sup>7</sup> For example, piperonyl

butoxide, is one substance thought to cause cancer of the breast or prostate, as well as tumors in children's brains.<sup>7</sup> This substance is also reported to combine with pyrethroid chemicals to prevent the liver from filtering and eliminating toxins from the body allowing potentially harmful pollution to accumulate in the body.<sup>5a,b, 19a-d</sup>

### Who Is Most Vulnerable to the Chemically Polluted Air? <sup>19</sup>

- Fetuses, infants, children, pregnant women, the elderly and those who have a depressed immune system (for example, from cancer therapy), are the most likely to be adversely affected by toxic chemicals.<sup>85</sup> It appears that the chemical can be found in pregnant women and their offspring. *(See new Chapter 5.)* One study showed that the exposure of pregnant women to indoor pesticides was considerable and one study showed no effect.<sup>121a,b</sup> Their urine showed excessive levels of break-down products from several toxic pesticides. Further studies need to be conducted to determine the effects these chemicals can have on the developing fetus and infant.<sup>107</sup>
- Pesticide sprayers are also in increased jeopardy. *(Some of the men who sprayed in NYC claim that they were saturated with the chemicals when they applied it and subsequently they have become ill.)*<sup>19, 80</sup>
- Chemically-exposed women have more birth injured children than normal.<sup>8, 85</sup>
- Pesticide chemicals can suppress the immune system in both humans and animals.<sup>3a</sup> Initially this can lead to repeated infections and allergies, but in time it can cause reproductive and learning problems, as well as blood disorders. Late or end stage effects can lead to cancer and degenerative diseases such as rheumatoid arthritis, lupus erythematosus and multiple

sclerosis.<sup>2, 65</sup>

### **You Need to Ask Yourself**

If your family or you were exposed to malathion or other chemical sprays, how would the above symptoms affect your child's school performance and your own ability to think or function well at work? The answers might not be known right away, but eventually most of those who were seriously harmed will find out. Some NYC residents have already seen changes in their children and themselves but relatively few suspect the sprays. Unfortunately, the full effects of toxic poison sprays might not be evident initially at the time of exposure. Some medical effects might not be recognized for years. Once you are aware of the possible cause of any symptoms you have, there are some ways you can try to credibly document and treat your medical complaints. (*See Chapter 3.*)

### **What Does Malathion Do to Wildlife?** <sup>2, 11, 19a,c, 30, 41, 65, 66, 80</sup>

- Bees, waterfowl, freshwater fish, lobsters, shrimp, clams, snails, worms, butterflies, dragonflies (that eat mosquitoes) and other beneficial insects, as well as frogs and birds, can be seriously damaged by malathion or various types of pesticide sprays.<sup>2, 80, 19</sup>

The economic impact can decimate entire businesses, such as the Long Island lobster industry in New York and Connecticut. There are reports some have been almost destroyed from the spraying.<sup>30, 65, 80</sup>

- Both domestic and laboratory animals have been reported to show evidence of genetic, immune and reproductive system damage after malathion exposure.<sup>65</sup>

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- Male and female rats have different types of toxic responses due to variations in their metabolism, storage and excretion of chemicals such as malathion.<sup>19c, 41</sup> In general, female animals appear to be more susceptible to pesticides than males,<sup>41</sup> although some studies, not all, show tumor development in both sexes.<sup>2, 41, 67</sup> *(In humans, females appear to be more sensitive to chemicals.)*
- In one rat study, it was claimed that ingested insecticides diminish rat growth by 25%, but if rats were also given vitamin C, the decrease was only 10%.<sup>20</sup> *(We do not know if this would also help humans who are sprayed with toxic insecticides.)*
- Rat studies also have suggested they can have difficulty remembering after exposure to malathion.<sup>2, 19</sup> *(Human studies also have shown decreases in intellectual function, such as abstract or flexible thinking after exposure to certain pesticide poisons. See Chapter 4[5].)*<sup>21a,b</sup>
- The results of one study suggests breast tumors develop in about 14% of rats given parathion, and 24% of those given malathion.<sup>25</sup> *(It might take years before these types of changes become evident in humans. What happens will depend, in part, upon the genetics of each person and the degree, duration and exact type of adverse exposures.)*
- One single oral dose of malathion was shown to cause a reduction in lung cells in rats.<sup>104</sup> This only occurred in relation to the “technical grade” malathion which has more impurities in contrast to the more pure form.<sup>19a,c</sup> Some of the malathion used in NYC was said to be technical grade.
- Low doses of pyrethroids have been reported to cause irreversible brain changes in mice and thyroid suppression in

rats.<sup>19c, 65</sup>

- Mice are reported to develop liver cancer and tumors in the thyroid and breast from malathion; so do lizards.<sup>2, 19a,b</sup> In rats, the evidence is inconclusive.<sup>25, 41</sup>
- Fish exposed to low level concentrations of malathion develop damaged and deformed gills.<sup>2, 19, 22, 23</sup> Very low concentrations (1 to 5 parts per million) also is said to cause heart defects in fish, especially if the exposure is to more than one pesticide.<sup>19, 23</sup>
- Turtles are reported to develop birth defects after malathion exposure.<sup>19</sup>
- Frogs injected with DDT, malathion or the chemical cyclophosphamide are reported to have decreased immune function. This can cause antibody production to decrease to only 1% to 2% of normal.<sup>68</sup>
- Minute doses of chemicals in less than one part per million are said to cause a variety of deleterious effects in frogs.<sup>19a, 68</sup> Frogs exposed to pesticides such as malathion and atrazine are likely to have weakened immune systems and limb deformities.<sup>69</sup> Tadpoles are reported to be have unusual swimming patterns because of malformed tails and heads from such malathion exposures.<sup>19a</sup>
- Hens fed malathion and carbaryl are reported to develop a number of health problems which increase as the dose of pesticide in their mash is increased. They had defective eggs, decreased hatchability and more birth defects. The liver and kidney of the affected chicks stored more malathion than usual.<sup>19a</sup>

- One study in pregnant animals showed no problems in the offspring until they were mature and had their own offspring. This second generation, however, weighed less, grew more slowly and had excessive infections.<sup>19a</sup>

### **What Does Malathion Do to Humans? <sup>19</sup>**

- In 1979 isomalathion was misapplied on agriculture during a malaria eradication program. Five of 2800 became ill and died.<sup>19a,d, 28a</sup> *(It has been reported applicators need a 11<sup>th</sup>-grade education so they can read the directions and properly mix and use the spray.)*<sup>115a,b</sup>
- One study states that infants born to pregnant mothers who were exposed in California to malathion sprays in the second trimester had more than twice the amount of intestinal disorders when compared to those who were not exposed.<sup>2,9</sup>
- One study in India showed malathion causes chromosome defects or DNA abnormalities in all doses tested in human white blood cells.<sup>19</sup> This type of effect could lead to birth defects and developmental abnormalities.<sup>19c</sup>
- In another study of white blood chromosomes loss was reported in humans after malathion exposure. This could weaken or alter the human immune system's ability to fight disease and cause genetic defects.<sup>19</sup>
- One child born to a mother who was exposed to malathion in a lice shampoo when she was three months pregnant developed serious muscle and birth defects.<sup>19</sup> *(One cannot conclude much from one report of one child but it does suggest we must be more aware of all kinds of possible effects from chemical exposures that occur during pregnancy.)*

## **Cancer Studies in Humans**

- In one report, seven children developed leukemia and aplastic anemia after exposures to malathion and other pesticides.<sup>19</sup>
- A Nebraska study in 1988 also showed increases in cancer in farmers after malathion exposure.<sup>87</sup>
- Another study in 1992 showed that malathion exposed farmers in Iowa and Minnesota had an increased risk of non-Hodgkin's lymphoma.<sup>2, 5, 24-27, 65, 87</sup>
- Similarly, employees in flour mills where malathion was used to control insects were said to more frequently suffer from lymphoma.<sup>2</sup>
- Reports indicate apple growers exposed to organophosphates, such as malathion, had an increased incidence of leukemia in comparison to a controlled population.<sup>86</sup>

## **Why Is There Confusion About Malathion and Cancer in Humans?** <sup>2, 19, 24-27, 86</sup>

We do know there is quite a bit of evidence, as indicated above, in exposed mice and rats that pesticides can cause cancerous tumors in the brain, liver, lungs, blood and endocrine glands, such as the thyroid.<sup>2, 26, 41, 109</sup> We also know that pesticides depress the immune system and that alone can lead to increased infections and make women, for example, more prone to breast cancer. We know malathion can cause chromosome changes in human blood cells and this can lead to birth defects and developmental problems.<sup>10, 19a, 30a</sup>

There are conflicting opinions, however, about the development of cancer in humans related to malathion exposure.<sup>2,3</sup> As indicated previously, several studies do suggest such a relationship is possible.<sup>14, 19, 26, 27, 86</sup> The skeptics stress these are not large studies, and this makes it difficult to fairly interpret any conflicting or sparse data. When negative scientific reports involve economics, however, it is sometimes of value to know exactly who paid for and was involved in such studies.<sup>109</sup> For example the lead attorney for Cheminova (a company producing toxic chemicals) was reported to have been a former EPA attorney who worked on malathion issues for the EPA. It has been stated that he disagreed strongly with pathologists who believed malathion was a "likely human carcinogen". (See Chapter 8.)<sup>39a,b</sup> We obviously need more research so we know if there is a significant cancer danger in humans or not.

### **Did the EPA Change its Report About Cancer?<sup>28a-c</sup>**

An anonymous source stated that EPA scientists had concluded and were about to report that malathion was a "suspect" carcinogen. One day before the report was to be released on May 10, 2000, however, their risk assessment was revised. The EPA's final report was reversed overnight after it was suddenly *decided to use the interpretation of the data supplied by the chemical industry rather than that of the EPA scientists*. Just prior to the announcement, the pesticide's manufacturer had supposedly requested another interpretation of the EPA's data.<sup>28</sup> At that point it was decided to re-classify malathion to a "lower level carcinogen". By changing the level of risk from "suspect" to "lower level", it meant that measures to monitor and protect the public were markedly diminished. The final published report concluded there was "insufficient evidence" to decide about its carcinogenicity. Who decides to let the fox design the hen house? Why did they do it?

One major challenge in this type of research is that it takes many years after an exposure before cancer becomes evident. This makes it more difficult to prove a cause and effect relationship. In animal research, you must always ask how long the animals were studied *after* a possible cancer- causing exposure or a false conclusion can easily be reached. Even when an inordinate number of animals develop this illness, those who are pro- chemicals will say that humans are not rats, so the information is of little value. Disregard of this type of evidence in the past, however, has proven animal illnesses do, indeed, warn us -- if we will only listen.<sup>113, 114</sup>

### **How Can You Personally Confirm a Possible Harmful Pesticide Exposure?<sup>17</sup>**

Organophosphate pesticides are no longer in the blood after 24 to 48 hours so tests to document exposures should be done as soon as possible. Some of the breakdown products, however, can be measured after a longer period of time. The most helpful laboratory test to confirm a possible organophosphate poisoning is the CD 26 or Ta1 antigen memory test. In addition, an auto-antibody test, especially to anti-myelin, would suggest damage to the sheath that covers nerves. This type of antibody is associated with symptoms in the nervous system and/or brain. You can check with your doctor about available laboratory tests to examine your own blood. (*Accu-Chem: 972.234.5412 and ImmunoScience, Inc.: 800.950.4686.*)<sup>89, 90</sup>

In some patients there are also measurable decreases in levels of acetyl-cholinesterase. This lack can greatly impede normal nerve impulse transmission. (*See Chapter 3 for more discussion of the importance of this in relation to nerve impulse transmission and where confirmatory tests regarding chemical exposures can be*

done.) To contact an environmental medical specialist who is knowledgeable about how to recognize, diagnose and treat these types of illnesses call 316.684.5500.<sup>88</sup>

### **What Is The Antidote for Malathion?<sup>4a</sup>**

The antidote for organophosphate poisoning, such as malathion, is 2 PAM or Protopam. It must be given within 24 to 48 hours to be effective. This should be available in most emergency rooms. *(This will not help poisoning due to the class of pesticides called carbamates. For malathion or toxic carbamates, atropine is helpful.)*

### **Before Pesticide Spraying, What Should the Public Know?<sup>19a, 30a, 64, 78, 79a, 103</sup>**

You should be aware of the common medical problems listed in Table 9a. Some additional information might also be helpful.

### **In Relation to Mosquitoes:**

- Even the CDC (Center for Disease Control) says that daytime aerial spraying is the least effective method of insect (mosquito) control.<sup>70</sup>
- Studies have shown chemical sprays from planes have been found 22 miles from targeted areas. They may not hit a mosquito, but they potentially can travel long distances and find human targets.<sup>24b</sup>
- Spraying wipes out the natural predators to mosquitoes and also is reported to create mosquitoes that are more pesticide-resistant.<sup>24,b,30</sup>

- One report indicated malathion makes some mosquitoes more aggressive for up to two hours after spraying.<sup>78</sup>

### **In Relation to Animals:**

- Birth defects have been noted in animals exposed to malathion or its breakdown products.<sup>2, 14</sup>
- Exposed pregnant ewes produced stillborn, aborted fetuses and had offspring that weighed less than normal.<sup>108</sup>
- In other animals, ulcers, testicular atrophy and blood sugar increases have been noted, as well as kidney, liver, adrenal and gastrointestinal changes.<sup>2, 3a, 19a-d</sup>
- The neurotoxic effects of malathion may not begin to be evident for one year after exposure.

### **In Relation to Humans:**

- Many do not realize that sudden uncontrollable aggression or an inability to think, speak, or walk normally can be manifested in some children or adults after pesticide or chemical exposures.<sup>17</sup>
- Many aspects of a child's future health, sexuality, development or learning ability might be adversely affected by repeated toxic exposures to organophosphate pesticides.<sup>2, 4b, 19a, 30a, 92</sup>
- Toxic chemicals might possibly genetically damage an unborn child.<sup>2, 10, 11, 12</sup> It is known that mothers working in cotton fields exposed to malathion and other pesticides had

children with chromosome breaks. This means that there is damage to the gene or cellular structure of exposed children.<sup>2</sup> Mosquitoes also have proven genetic damage from malathion.<sup>3b</sup>

- There are critical, brief periods of time during pregnancy when breathing pesticide- contaminated air is potentially exceedingly harmful to an unborn infant (and many other forms of wildlife).<sup>117</sup> Those who want to increase their chances of conceiving a normal child should select a time when the air is *not* heavily polluted with chemicals.<sup>110</sup>
- In the San Francisco Bay area, there was a correlation between ear and bone anomalies associated with malathion exposure.<sup>91</sup>
- According to Alfredo Sudan M.D., Ph.D., an authority on malathion, "It should not be used in the home."<sup>15</sup>
- Omar Shafey M.P.H., Ph.D. was the health department official in Florida who recommended that the use of the organophosphate pesticide, malathion, be stopped. He suggested that Florida should compensate injured residents and provide shelter for those who wished to evacuate if spraying was to be continued. He firmly believed this chemical was responsible for adverse health effects and had no direct health benefits. It is reported that when he refused to alter his report, he was suddenly dismissed and the reason given was an alleged overcharge of \$12.50 on a travel claim for reimbursement. Is it possible that the real reason was his refusal to alter his Health Department Report that recommended malathion spraying for medflies be stopped and suggested that those who might be hurt, be protected?<sup>16a-d</sup>

## **How High Is Your Risk of Becoming Ill with West Nile Encephalitis?** <sup>3a, 29</sup>

What you should know:

- In Africa, where the West Nile Virus has been evident for 60 years, there have been very few epidemics.<sup>3</sup>
- Less than 1% of mosquitoes exposed to the virus are infected.<sup>84, 81</sup> Even if you are bitten by an infected mosquito less than 1% will become severely ill, and of those who become ill, the vast majority will not be sick enough to know they are infected.<sup>3b, 64, 84</sup>
- It has been reported that more than 80% of Egyptians were previously or are presently infected with the West Nile virus but, in general, only the very elderly or those with weak immune systems are seriously at risk.<sup>29</sup>
- The majority of those who were killed by the virus in a recorded Israeli outbreak were over 80 years old.<sup>29</sup>
- Human mortality varies from 3% to 15%, mainly in the elderly. Other studies predict much lower rates.<sup>84</sup>
- Four years ago in Bucharest, Romania, an outbreak of West Nile fever implicated a flavovirus that affected about 500 people with more than 50 dying. Epidemics obviously can be serious but the strain of virus in Romania appears to have been different than the one found in the NYC area.<sup>29</sup>

- As of September 10, 2002, there were 113 cases of West Nile illnesses in the United States and only five people had died.<sup>80</sup>  
<sup>81</sup> At that time, it was estimated your chances of dying from the illness was one in a million. There was some reason for concern, however, because by December 2002 the statistics were 3,852 cases of West Nile virus in the USA and 241 deaths. These occurred mainly in Illinois and Mississippi, each with about 50 cases. Most of the remaining states had only from than one to ten cases.<sup>79d</sup> Again those who died were older and had weakened immune systems.

{{box}}

***If an Epidemic Is Due, What Should You Do?***

**We hardly have an epidemic at this time but it is imperative that safe ways to control this problem, without chemicals that hurt humans, be in place *before* your city decides how to handle any mosquito problem during the next few years. Is your city ready? Will they spray with malathion or other harmful chemicals without informing you?**

**Box end**

**Was NYC at Risk from West Nile Viral Encephalitis?<sup>3a,f</sup>**

- In NYC in 1999, with a population of about 7 million, only 62 people became ill with the virus, or less than 10 persons per million. A high estimate suggested if you were bitten by an infected mosquito, less than 1 in 300 would show mild signs of a flu-like illness.<sup>3a, 30</sup> Based on current information on casualties, the odds of an American dying from this virus is roughly one in a million.<sup>3a</sup> Was there really such a high risk of a deadly epidemic that such drastic action as repeated extensive spraying with toxic chemicals was justified –

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especially when safer, equally effective and less expensive methods of insect control measures were available?<sup>71a,b, 80</sup>

- In NYC, only seven, or one in a million, died and they were all between 68 and 87 years old. In addition, three of these were on drugs to suppress their immunity. In the year 2000, only one person died in New York and New Jersey, although 17 did become ill.
- Outside the New York area, there are some statistics. There were six birds positive for the West Nile virus in New Hampshire and 448 in Massachusetts in 2000, but no human cases of encephalitis in either state.<sup>30</sup>

Those in favor of spraying will believe their prophylactic spraying measures helped prevent an epidemic. Weigh this possibility against the more probable one. In time, if and when all the facts are known, it may be determined that the health of an immense number of humans were temporarily or permanently hurt because they developed a chemical sensitivity illness due to the exposure. Major basic questions remain unanswered. Were millions needlessly exposed to toxic malathion? Was the treatment much worse than the disease? Did the treatment make the illness worse?<sup>3b</sup> (*In Brevard County in Florida, for example, a mosquito problem was treated with the chemical Dibrom® over an 11 year period. They found it not only did not help, but it was reported that there was 15 fold increase in the number of encephalitis- carrying mosquitoes.*)

The true benefit/risk ratio in relation to the malathion spraying in NYC will be difficult to assess. Patients called their doctors for help but the NYC officials did not create a NYC "hotline" initially and sick people complained when they refused to accept information about the immediate health-related complaints

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associated with the pesticide spraying.<sup>116</sup> Why would those who tried to communicate their illness to authorities be met with so little success?

{{Box }}

**The final conclusion is: Toxic chemicals can be used in an effort to protect the public from epidemics that do not exist; and if, in fact, there are mosquito problems, safer, more effective, and less expensive alternative control measures are known and readily available.**<sup>71a,b, 80</sup>

(End of box)

## **Additional Comments of Interest and Value**

### **In Humans**

- We must ask: Why was some of the mosquito spraying done in the daytime when mosquitoes are nocturnal? Even at night the city streets and playgrounds were not breeding grounds. Were humans needlessly exposed?<sup>32</sup>
- In California, Florida and Japan, thousands of gallons of toxic malathion were used in recent years to control medflies or fruit flies. Each group eventually concluded that there were safer and better ways to control these insects.<sup>9, 15, 16a-d, 36-39,120</sup>
- Most people in Florida and Alabama are not aware that without any public warning, trucks or planes regularly spray toxic chemicals, such as malathion, around and in buildings and on beaches for insects, weeds and fungi. This sometimes is done in the daytime.
- In 1969, 98% of children in an agricultural area in Japan, where malathion was applied regularly, had well-documented reduced

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visual acuity and myopia.<sup>40a,b, 106</sup> This was not evident during the years this chemical was not applied.

- Malathion spraying can contaminate the air, water and soil. In one California study, 5 out of 28 county water systems were contaminated. In one river, 30% of the malathion continued to be present in the water one month later.<sup>2, 88</sup> It is reported that if water is contaminated, it lasts for about one to six weeks depending on the type of water (fresh, distilled, pond etc.).<sup>41</sup> If soil is contaminated with malathion, the half life is 1 to 25 days.<sup>2, 3b, 41</sup> You might want to determine how many chemicals are in your drinking water or soil.\*<sup>88, 89</sup> Accu-Chem: 972.234.5412, or ImmunoScience Lab: 800.950.4686
- The Food and Drug Administration has detected malathion in about one in five food items. The EPA has found a report stating malathion residues were 1100% in excess of the amount considered safe for children and 500% in excess for adults.<sup>2</sup> How high are the levels now in foods presently grown in the NYC area? How much malathion is in the foods you or your children are eating?
- A secret memo issued by the NYC Police Department at the time of the spraying warned officers to stay at least 25 feet from the spray, put their air- conditioning vents on re-circulate, wear protective clothing, keep the patrol car windows tightly shut and avoid all contact with the spray.<sup>5, 42</sup> Why were the New York residents not similarly warned? If malathion is really as safe as the politicians claimed, why should the NYC police be warned to be so cautious?<sup>5, 43a,b</sup>

### In Wildlife

- Birds are the original carriers of viral encephalitis. The mosquitoes become infected after they bite infected birds and

then we are infected when these mosquitoes bite us. Of the thousands of mosquitoes who bite and infect birds, only one or two of them develop the illness. Up to 70%, however, can become infected with the virus.<sup>31</sup> *(Most illnesses typically affect a relatively small proportion of those exposed, except when an epidemic occurs.)*

- There is one controlled laboratory report indicating the West Nile virus causing encephalitis spread from bird to bird *without any interaction with mosquitoes*.<sup>31b, 33</sup> If this were true, mosquito control would certainly not be the total answer to control this virus.<sup>29, 34a,b</sup>
- More crows died from pesticides, along with many beneficial birds, than from the West Nile virus from July 1, 2000 to March 31, 2001.<sup>35</sup>
- It is evident that crows and horses are more sensitive to this virus than humans.
- Dogs, cats and horses can become infected with the West Nile virus but, like humans, they usually recover.<sup>2, 11, 18, 30a, 65, 66</sup>

### **What About the Additional Health Impact of the World Trade Center Attack?** <sup>93a-c</sup>

In spite of the initial assurance that there was no immediate danger from the many contaminants polluting the NYC air after the September 11, 2001 attack, there is much that needs serious consideration. The environmental impact of this additional, ongoing pollution, added to the years of extensive and repeated aerial spraying with malathion and other chemicals, can greatly increase the potential health concerns of all those living in the vicinity of NYC for many years.

The destruction of the Twin Towers caused toxic fumes and smoke to be released which contained dust particles, pulverized cement, glass, fiberglass, sheetrock, germs, molds, carbon monoxide, solvents such as benzene, toluene, xylene and volatile, gaseous organic compounds. Chemical fires released aromatic hydrocarbons which are highly carcinogenic. These exposures can irritate the eyes, nose and throat but more importantly, they can potentially damage the lungs, liver, heart, kidneys and nervous system. Some are suspect or definite carcinogens.

Specific released toxic chemicals included dioxins (industrial waste), construction materials from wood, natural gas, phenols (resins, adhesives), phthalates (plastics) and PCBs (polychlorinated biphenols, found in paper, plasticizers, compressors, heat transfer systems, etc.). To this list must be added the toxic jet fuels, the toxic metals asbestos and mercury and a multitude of infectious germs and fungi. Many of these materials or inhaled substances are known to damage the immune, nervous, endocrine and reproductive systems. These types of exposures can lead to birth defects and developmental delays in children, and possibly cancer in adults. As time passes, the full impact of this environmental catastrophe will become evident in ways that are presently not fully evident, understood or appreciated.

By October 2001, more than half the students and the school's staffs on the edge of the Ground Zero area suffered from respiratory symptoms (shortness of breath and persistent coughing). At the present time, fortunately, the respiratory symptoms, anxiety and depression are diminishing. It has been reported, however, that some of the diligent workers who tirelessly helped for days, weeks and months at the time of the tragedy, are now beginning to realize that their lungs, in particular, have been affected. All these individuals should be medically monitored for

any future illnesses and assisted indefinitely if that is required.<sup>93a-c</sup>

The effects of the individual role of the West Nile mosquito and the associated malathion and other chemical exposures plus the massive air pollution from the World Trade tragedy cannot be fairly determined. We have insufficient data, for example, to fairly evaluate the incidence and types of physical and emotional complaints before and after the malathion spraying. Is there an overlap of those who became ill after malathion or other chemical spraying and those who developed serious illness after exposures from the 9/11 Trade Center collapse? I would be surprised if this were not true.<sup>44,72</sup> Theoretically, malathion or similar chemical exposures would be expected to increase the number of those affected by chemical sensitivities, and these individuals in turn would be more prone to be more seriously affected by inhaling the additional air pollution from the 9/11 disaster.

The Department of Health and Human Services was supposed to be given funds (\$90 million) to make a registry to monitor the health of 100,000 to 200,000 New Yorkers who were exposed in the ground zero vicinity of the World Trade Center.<sup>73</sup> It was disappointing to read a report that President Bush did not sign the appropriation bill with the result that the money designated to provide care for those who were made ill, did not become a reality. It was reported that *spending restraints were needed and the money was supposedly not to be used for pressing needs and priorities, but for emergencies*. Hilary Clinton recognized that those who became so ill and incapacitated from helping with the rescue work deserved more than a medal and praise. Some will need ongoing specialized medical care. It is certainly possible that more than a few will have perplexing chronic illnesses because of their exposures and need the expertise of environmental medical specialists. (Call 316. 684.5500. We should provide for every single worker who so diligently helped to save lives and clean up

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the ground zero area. We also should medically evaluate and monitor the health of the aerial and ground pesticide spray applicators.<sup>30a, 80, 94</sup>

In time, hopefully there eventually will be some studies about the effects from the repeated malathion exposures in NYC and elsewhere. This should include studies, for example, to determine if there is a significant increase in the number of children who need to wear glasses in NYC, as happened in Japan.<sup>40b, 106</sup> In the next few years, do the rates of cancer and multiple sclerosis increase more than anticipated or elsewhere? Do the number of eligible sperm donors decrease more than in the past or than in other countries? Eventually, we should have some definitive answers. If these highly exposed individuals are given appropriate nutrients, urged to avoid chemicals in all forms in their air, water, foods and clothing and taught methods to detoxify their bodies to help eliminate the chemicals and toxic metals stored in them, they should be much less likely to become more seriously ill, now or in the future.<sup>46b</sup> (*See Chapter 3.*)

### **How Can New Yorkers Help Diminish the Effects of the Malathion and the Twin Tower Pollution?**

In essence, one major challenge is to get rid of the chemicals stored in the body. (*For more details see Chapter 3.*)<sup>17</sup>

- Nutrients will help in many ways. Antioxidants, including vitamins B2, C and E, superoxide dismutase, N acetyl cysteine, L cysteine, folic acid, selenium and garlic would help to strengthen the immune system. L glutathione is needed and helpful because this is a major component in the human body's antioxidant defense system. (*Ask your doctor about the new under the tongue form available from College Pharmacy: 800.888.9358.*) N-acetylcysteine, alpha lipoic acid, CoQ 10,

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vitamins C and E, taurine and glutamine have all been suggested to help to increase the body's glutathione levels. These substances might be combined in some products and should aid in reducing the toxic burdens in the human body.<sup>77, 95-96</sup>

- Additional natural ways to detoxify exposure to biological toxins include green tea, garlic, oregano oil, melatonin, iron-binding chelators, Huperzine A (Chinese club moss).<sup>46c, 77, 95, 96, 97a-f</sup> Check with your physician.
- Inhaled asbestos fiber exposure is particularly toxic, and for this the flavonoids in green tea are thought possibly to be helpful.<sup>74</sup>
- To evaluate possible heavy metal poisoning, a hair analysis would be helpful.<sup>46a,b, 47</sup>
- Detoxifying homeopathics or herbal under the tongue drops and remedies and teas might be beneficial.<sup>45, 46b</sup> (*See Chapter 3, Table 3.D and Appendix B.8 and D.4*)
- Dry or wet saunas, (*See Chapter 3.*)
- Lymphatic drainage and massage.<sup>75a,b, 119a,b</sup> add new info. about machines to do this **DJR TO ADD A PARAGRAPH HERE**
- Various types of liver, kidney and bowel cleanses are claimed to be helpful.<sup>45, 46a,b,c, 76a,b</sup> Some of these methods require more patient studies and more solid scientific evaluation but they have been used by different cultures for many years. They all appear to help some excrete some of the chemicals or toxic metals stored in their bodies.
- Research is presently being conducted to evaluate the Life Vessel which appears to be a helpful for some with chemical

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sensitivities.<sup>75b</sup>

- If you are concerned about prevention in relation to some global or local emergency situation, there are kits available with detailed instructions about what is needed and how to protect yourself if there is another devastating public health disaster. The necessary information is contained in the First Response Kit supplied by Klaire Laboratory.<sup>77, 96</sup>

### What Can You Do to Prevent or Treat West Nile Encephalitis?

<sup>43a,c</sup>

There is no cure for West Nile encephalitis. Symptomatic treatment with liquids or antibiotics is available, if needed. Remember, if you are bitten but in normal good health, your chance of developing this serious illness is truly remote.

- The development of a West Nile genetically altered strain of vaccine called OroVax has been in progress for some time.<sup>3b, 43a, 60, 98</sup> It uses the technology of ChimeriVax, which is a subsidiary of the United Kingdom biotech company called Peptide Therapeutics. It is being designed for use in an impending epidemic but was not available as of 2002. The big questions remain. Can the genes in this vaccine be incorporated into your own DNA? What can they do to you as time passes? (See Chapter 7 on genetic engineering.) *Sent email to find out if available 3/24*
- A drug called Intron-A, a cloned version of interferon, has been developed by Schering-Plough Corporation (908.298.4000), to fight viruses and stimulate the immune system.<sup>61</sup> This will be tried only on those patients who have developed encephalitis or inflammation of their brain from this infection. This same vaccine is supposed to help those patients with Hepatitis C, which is in the same class of viruses as the West Nile.

## THE MOSQUITO CHALLENGE<sup>71a,b, 80, 105</sup>

The remainder of this chapter discusses how you can protect yourself against infected mosquitoes without being hurt from the treatment. See if you can urge your local health officials to consider safer methods of insect control. There are effective ways to target mainly the mosquito and not harm other insects, humans or the balance of nature.

### How Are Mosquitoes Claimed to Be Safely Eradicated?<sup>71a,b, 80</sup>

NYC officials claim that pesticide spraying lowers the mosquito count by 85%; others report this method helps control 60% to 80%. In Florida, where they have had extensive mosquito-control experience, they state they found only a 30% reduction using trap studies. As indicated earlier, after extensive pesticide spraying in California, Florida and Japan, all three concluded that there were more efficient and safer ways to control insects than the use of malathion. (*Call Get Set: 800.221.6188.*)

Even more surprising, one 11 year research project found evidence that encephalitis infected mosquitoes initially decreased after spraying, but after repetitive pesticide use there was as much as a 15-fold increase in their numbers.<sup>3b</sup> Does this mean we were making the situation worse by spraying with pesticides? Does spraying cause "super" pests to develop because only the strong ones survive and reproduce? Will this eventually make certain mosquitoes increasingly difficult to control? This type of information should have been known long before sprays were used.

### Points to Consider in Mosquito Control

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- Does malathion kill the natural predators of mosquitoes? The answer is yes.<sup>71a,b</sup>
- Malathion spray has been observed to make some mosquitoes more aggressive than normal.<sup>78</sup>
- Research has indicated toxic pesticides damage the immune system and genetic structure of mosquitoes making them more prone to illness from the virus.<sup>3b, 49</sup> Similar effects, however, also have been suspected to occur in humans.<sup>14, 21</sup> Some have written about their serious concern about the potential for increasing the risk for contracting bacterial or viral infections, especially because very low levels of this chemical appears to have the potential for more harm than previously recognized.<sup>19a,c</sup>
- The environmental and economic spatter effect of the NYC malathion and pyrethroid insecticide spraying is immense. The total ecology and balance of the marine environment (including fisheries, shrimp and shellfish) and the economy of these industries, appears to be in jeopardy. This might be just one more unanticipated splatter effect of the malathion spray.
- It appears that mosquitoes may not be as sensitive to pesticide sprays as other forms of life. For example, it is estimated that more than 10 million lobsters died in the western part of Long Island Sound.<sup>30</sup>
- The West Nile virus spread across the country in the late summer of 2002.<sup>79c</sup> (*It is expected also to be a problem in 2003.*) The fear of encephalitis created a varied response. Some community leaders petitioned for no spraying and others insisted on it be done as soon as possible. Most need to become more informed before they make decisions in this regard. Dr. L.

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Horowitz's book, *\*Death in the Air* would be worth reading for anyone who are more fearful of mosquitoes, than of pesticide sprays.<sup>79a,b, 118</sup>

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### **How Can You Personally Prevent Mosquito Bites? <sup>80</sup>**

- **Wear long sleeved pants, shirts, hats and high socks when outdoors.**
- **Do not wear dark clothing.**
- **Keep away from dark, damp areas with shrubs and bushes.**
- **For unknown reasons, mosquitoes are attracted to beer. If concerned, avoid drinking it, particularly when outdoors.**
- **Do not wear regular scented fragrances, perfumes or shampoos that attract mosquitoes. Do not smell of body odor or perspiration. The essential oils listed below are believed to make you less attractive to mosquitoes.**
- **Apply insect repellents to clothing, not skin.**

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### **Skin Preparations to Prevent Mosquito Bites**

There are a number of herbal repellants to ward off mosquitoes. (*Similar to bees, mosquitoes tend to prefer some people more than others.*) The following might be helpful:

- "Do it yourself" non- toxic repellents can be created providing you are not sensitive to the product used.<sup>80</sup> Natural repellent mixtures contain some mix of the essential oils of peppermint, eucalyptus, lemongrass, citronella and catnip. Try to use only natural, therapeutic grade, essential oils. Ten drops of the essential oils can be mixed with two tablespoons of non-rancid vegetable oil. Mix and dab on clothing. (*Pregnant women and*

*those who are chemically sensitive to the aroma of perfumes should always check first with their doctor before these are used.)*

- Mosquitoes do not like the following herb aromas: garlic, cedar wood, lemongrass, frankincense, cinnamon, geranium, eucalyptus, basil, rosemary, cloves, peppermint, lemon balm (citronella), onions, feverfew, thyme and marigold.<sup>80</sup>
- Naturale Ltd.\* , a vapor wristband that is said to give insect protection up to 60 hours.<sup>56</sup>
- Bite Blocker™ is said to provide 97% insect protection.<sup>57</sup>
- Natrapel, a citronella-based lotion reported to be 84% effective against mosquitoes.<sup>58</sup>
- Avon Skin-So-Soft™, another citronella-based repellent, said to provide about 40% protection.<sup>59</sup>
- Neem oil is used as a mosquito repellent cream is reported to be highly effective against 75% of certain mosquitoes.<sup>80</sup>
- Herbal Armour™ proved as effective and safer than certain forms of DEET- containing products\*. <sup>30c,d, 83, 99</sup>

*\*Caution: Do not use products that contain DEET as repellents in concentrations over 30% because they have been reported to cause very serious illness in some children. <sup>30a-d</sup>*  
<sup>83</sup> *The EPA says it is illegal to label such products "safe for children" but lower percentages of DEET containing products can be legally sold in stores and labeled as safe. It has been reported that under certain circumstances some products with old labels, which are not considered to be safe for children, can be sold for four additional years because the manufacturer was given a special "grace" period.<sup>30b</sup> Again, read all labels and keep asking why. <sup>30a-d.</sup>*

- Items that do *not* appear to help include Vitamin B<sup>2</sup> (thiamine

hydrochloride), ultrasonic and electronic repellents.

### **What Are Safe Mosquito Control Measures to Discourage Mosquitoes Inside and Around Your Home?** <sup>43a,c, 48a,b, 71a,b, 80</sup>

- Use a fly swatter.
- Use fans indoors because mosquitoes do not like drafts of moving or circulating air.
- Repair screens.
- Close outside doors tightly.
- Use "yellow" bug lights at night.
- Avoid outside nighttime walks in damp or wooded areas.
- Keep grass cut short.
- Clean up clutter, debris and remove garbage.
- Trim landscape, bushes, vines, etc. near buildings.
- Clear vegetation from pool and stream edges.
- Turn over any containers or furniture that can accumulate water.
- Fill empty ditches or natural tree cavities.

### **How to Prevent Mosquitoes from Maturing** <sup>43a,c, 80</sup>

- Eliminate breeding sites of standing water such as swamp areas, irrigation ditches, basements and sump pump areas etc. near buildings. This will help diminish breeding grounds with larvae and immature insects.
- Empty water from containers such as old tires, buckets, cans, swimming pool covers etc. that can serve as breeding areas.
- Drain water from bird baths, fountains, wading pools, plant pots and drip pans twice a week.
- Eliminate drips from air conditioners, water in gutters or standing on flat roofs.

## What Are Specific Safer, More Effective Mosquito Control Measures To Use Outside? <sup>44, 55-59, 80</sup>

The following are said to be examples of potentially better and safer ways to control mosquito infestations outside your home. The aim is to eliminate the larvae, not the adult mosquito.

- *Bacillus sphaericus* makes a toxin that can kill when it is ingested by the mosquito larvae during the first early two stages of their development. It lasts for about 32 days. *Bacillus thuringiensis* and *israelensis* are powerful and highly selective in controlling insects. Unlike malathion, these products are toxic but only to a very narrow range of organisms.<sup>50, 51a,b</sup> In moderate to high concentrations they eliminate half the test population of some mosquitoes in 15 minutes and the rest in about an hour. Some mosquitoes die in five minutes.<sup>51</sup>
- Methoprene (Altosid®) is helpful for the more mature larvae in stage three to four. The effect lasts for 150 days.<sup>80</sup> It is toxic to fish and possibly to frogs.
- Try Arosurf. It forms a film on standing water and clogs the breathing apparatus of mosquitoes.<sup>52, 80</sup>
- Vegetable-based oils can be used to cover mosquito breeding areas such as the surface of stagnant water. The oil will smother the mosquito eggs and larvae.
- Trypsin Modulating Oostatic Factor (TMOF) is an insect hormone that stops the digestive protease enzymes from functioning so the target insect dies of starvation. Normally mosquito larvae eat chlorella green algae. If TMOF is added to the chlorella, the larvae quickly die because they cannot digest

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the algae.<sup>53, 100</sup>

- A microsporidium called Edhazardia aedis is said to be helpful.<sup>54</sup>
- The water fungus or mold called Lagendium giganteum is said to control mosquitoes. It is sold as Laginex in California.<sup>55</sup>
- There are some mosquito eating fish in the Gambusia genus.<sup>80</sup>
- Golden Bear Oil is a petroleum distillate and is reported to suffocate the larvae but there is a question because skin cancer in humans has been reported.<sup>105</sup>
- If a red food dye preparation called SureDye is ingested by a fruit fly, such as a medfly but not a mosquito, and is exposed to sunlight, it is said to kill the fruit fly without being harmful to beneficial insects or wildlife.)<sup>19a, 11</sup> It is said to be at least as effective as malathion.<sup>120</sup>

(For more information about safe insect control contact Get Set at 800.221.6188.)

## Spraying to Kill Mosquitoes<sup>80</sup>

Much more research is needed but studies indicate that the health effects of mixes of chemicals can be much more toxic than individual single exposures.<sup>19,83</sup>

- For aerial spraying to be effective in controlling mosquito-transmitted illness, it must be used about a month *before* an illness is expected to occur. Symptoms do not typically occur for 2 to 10 days after an infected bite and it takes another two to three weeks before the blood test confirms the presence of the virus. Sick chickens and ducks, not dead birds, can provide the first and best clues that there is a need for concern.<sup>80</sup> Birds fly so they may not be sighted near the original sources of mosquito

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infestation while chickens tend to stay near the area of potential concern.

- Those who do spray must know exactly how, where and when to apply the pesticide. Proper application with protective clothing and equipment is imperative. Aerial spraying is the least effective means of mosquito control.<sup>19a, 80</sup> Spraying from vehicles requires trained professional certified applicators who know *exactly* how to prepare the spray and when and where to apply it.<sup>30a</sup> Some do not know how to mix the chemicals they apply.<sup>111, 115a, b</sup>
- In this regard, consider the following. In NYC the company that owned the hired pesticide trucks was paid \$650 per hour to spray up to 16 hours a day over a three year period. Some of the \$11 per hour employees became ill and were reported to be both untrained and unsupervised.<sup>31a, 94, 115a, b</sup>
- The selection of which pesticide is critical. The synthetic pyrethroids as resmethrin (Scourge) and sumithrin (Anvil 10+10®) are less dangerous to humans and the environment than organophosphates such as malathion.<sup>82, 84</sup> These pyrethroids also have been linked to breast cancer and hormonal disruptions but these appear to be the lesser of the many possible pesticide evils.<sup>82</sup>
- One ingredient in the pesticide Dibrom® (naled) called trichlorofon is used for mosquito control. Guinea pig studies show that exposing them during the critical period in the uterus while the brain is developing can cause a *severe reduction* in the weight and shape of the brain. Could this happen to the offspring of exposed pregnant women? We do not know but in time we should have answers.

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- Dursban® is highly toxic and should be avoided. (*See Chapter 10.*)

### **What Should You Know Before Pesticide Spraying?<sup>80</sup>**

- Those who can be made ill should be informed 72 hours in advance of the spraying. The young, pregnant and those with weak immune systems or allergies might have to leave town or at least seal their windows and doors and stay inside.
- To be safer, close all windows and turn off intakes on air conditioners.
- Drinking water sources must be protected against contamination. (*Recent legislation allows for more legal water pollution in emergencies.*)
- Cover swimming pools.
- Keep children away from trucks that are spraying pesticides.
- Bathe pets after outside exposures or whenever foliage has been sprayed.
- Do not wear outside shoes in home.
- Remove outside lawn furniture and toys or wash them thoroughly if they have spray on them.
- There should be a hotline to your local health department to provide information and guidance about how to protect yourself and to report and record the incidence and type of medical problems that occur.

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**Remember, mosquitoes do not like drafts so a simple fan blowing directly on you can sometimes solve a buzzing nighttime mosquito problem.**

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### **SUMMARY**

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We must wonder what other evidence of problems will be found sometime in the future from the repeated use of malathion and other chemicals followed by the September 11th toxic exposures in New York City. Poison insect sprays can be potentially harmful to both children and adults. We must learn from previous poorly conceived medical decisions to use much more caution because all possible harmful effects will not be evident immediately. (*See Chapters 4 and 5.*) The health problems that arise in New Yorkers, now and in the next few to many years, will be difficult to interpret because the combined and repeated spraying of several pesticides followed by the September 11th exposures. Those who were closest to the World Trade Center, who also happened to have allergies will, in time, probably prove to be the ones who were in most jeopardy.

We need more research to answer basic questions before we further pollute large sectors of our country with toxic chemicals such as malathion. We must keep asking over and over:

- Why do officials chose to use a known poison, toxic to humans, when safer, better and less expensive mosquito- control measures are available? For example, one company was said to have received up to \$50 million for spraying NYC for a three years period.<sup>3a, 5a,b, 35b, 94</sup> Is it possible that someone, other than the company hired to do the spraying, stood to gain from this decision?<sup>94</sup>
- Why did so many politicians continue to expose the public to toxic pesticides when the proven danger of a deadly West Nile encephalitis epidemic appeared to be minimal?<sup>5a, 64, 78, 79a 84, 85</sup>

Certain dangers from malathion appear to be factual and frightening.<sup>19a, 85</sup> Others urgently need more research because of

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their immense potential harm.<sup>19a</sup> The bottom line is that someone might want to check on both the decisions and the decision makers in relation to any proposed pesticide spraying. Keep asking if vested interests could possibly cloud or obscure common sense, logic and good judgment.<sup>92</sup>

It is highly doubtful that the splatter effect of the NYC pesticide mosquito control will disappear as time passes. New Yorkers, in general, are much too well-informed and sophisticated not to eventually recognize what has happened and not to help themselves. Many will eventually learn what repeated spraying of poison pesticides, as well as the September 11 tragedy, has done to themselves and their loved ones.

Many rose to the occasion in a most impressive and admirable manner to the unforeseen and unsuspected World Trade disaster which could not have been prevented. Were those who insisted on continued spraying simply misinformed or did they sincerely not believe the many warnings they received? How can we measure the degree of child, adult and planet abuse caused by the chemicals they and other use so liberally? Time alone will tell and then we shall eventually see if the final outcome in some ways, even overshadows the 9/11 tragedy. Spraying with a toxic chemical to control insects can happen in your city. Now is the time for you to be concerned enough to protect your hometown and those who live in your area.

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***An Open Letter***  
**BY CONCERNED PHYSICIANS AND SCIENTISTS**

*April 2003*



## EXECUTIVE SUMMARY

**Indiscriminate and mass pesticide spraying against mosquitoes carrying the West Nile virus (WNV) will have detrimental consequences, immediate as well as delayed, on human health. The delayed impact will be especially harmful on the physical and mental development of children.**

**Pesticide spraying, especially in heavily populated urban areas, is far more dangerous to human health and the natural environment than a risk of WNV infection.**

**Re: lab testing & WNV encephalitis**

**The overall wellbeing of our population is declining and will continue to decline if we do not stop the unnecessary use of pesticides. Those most vulnerable in this chemical war against mosquitoes are children, pregnant women, the elderly, chemically sensitive and immunosuppressed individuals, such as patients with AIDS and cancer, and people suffering with asthma and other allergies. Ironically, it is to "protect" this group that such spraying has been mainly proposed.**

**It is necessary to make all people aware of the serious health impacts of such spraying. There are other, ecologically sound approaches that can be used to control and prevent the WNV encephalitis.**

**Pesticides suppress the  
immune system and  
therefore increase  
vulnerability to develop  
WNV encephalitis**

We, the undersigned physicians and scientists, have a particular interest in the impact of chemical pesticides on human health, and in ensuring that there is a proper widespread awareness about this important public health issue.

## I. DETERIORATION OF PUBLIC HEALTH BY MASS SPRAYING

Our primary concern is a widely spread erroneous belief that mass spraying of pesticides will protect the population and that such a program will result in protection against mosquitoes carrying the WNV. In fact, just the opposite is true; **the mass spraying will lead to a deterioration of public health by exposing millions of people to "friendly fire" pesticides.**

Ironically, such spraying is especially dangerous to young children whose immune system is not yet mature, and to an additional segment of the population with impaired immunity, for whose "protection" such spraying has been done (4-31).

The health impact of such spraying affects not only those living in the area, but it may potentially affect visitors as well. It has been recognized that **even a single exposure to pesticide spraying can trigger a manifestation of clinical symptoms in predisposed individuals (1).**

It will also affect the population in other areas because once pesticides (or any other chemical) are released into the environment, the spread cannot be controlled. It is spread mainly through wind, jet streams, rain and the food chain.

## **Exposure to pesticide spraying is much more dangerous than the risk presented by the WNV itself**

The spraying poses much more danger to human health than the health risk presented by the WNV itself. Even people bitten by an infected female mosquito, the carrier of this virus, run very little risk of serious illness (2-3).

- As reported by the Centers for Disease Control (CDC), Atlanta, the chances of a mosquito bite resulting in WNV infection and serious illness is extremely low (2).
- *The Question and Answer Bulletin* of the New York City Department of Health advises that, "**very few mosquitoes -- perhaps only one out of 1,000 -- are infected. Even if bitten by an infected female mosquito, your chances of developing WNV related problems are roughly one in 300**" (3).
- Michael Gochfeld, Professor of Environmental and Community Medicine at the Robert Wood Johnson Medical School and School of Public Health reports (4) that, based upon his experience and other WNV epidemics; typically less than one tenth of one percent of people bitten by infected mosquitoes develop any clinical signs of the disease. **In other words less than one in 1000 persons are bitten by infected mosquitoes** (see Appendix "A").
- Even those who have developed WNV related illness, usually have only mild forms with headaches, muscle aches, skin rashes and swollen lymphatic glands. More serious infections may cause headaches with high fever (2,3).
- It is extremely rare for a person to develop encephalitis (2,3). Available data indicates that almost all North

**Americans who developed WNV encephalitis in the year 1999 (62 people, 7 died) and the year 2000 (21 people, 2 died) were elderly and immunosuppressed. These people were residents of New York City and the surrounding areas. One person was a Canadian visiting New York.**

Comment: 2001, 2002 data

A positive test for WNV may be only a coincidental finding even in a death from encephalitis

- Even in those cases where death was attributed to WNV infection, the cause of death in these cases may not have been WNV. **WNV positivity could be a coincidental finding because the cause of death was a disease process unrelated to the WNV.** Thousands of individuals who had no symptoms tested positive for WNV antibodies, proving that they were exposed to the virus. They never became ill and were not even aware that they were infected with WNV until they were tested (3).

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Compared to the thousands of people who die each year from pneumonia and influenza (approximately 8000 in Canada alone), or the number of children who die of asthma, 9 people in the last 2 years combined, who tested positive for WNV and who subsequently died of encephalitis (mainly elderly and with impaired immunity) in a population with 10 million people – is an extremely small number.

Comment: change made - STATCAN

**Apart from transfusion and organ transplant, West Nile virus is not transmitted from person to person**

The WNV is transmitted to humans by mosquitoes, not from person to person (2,3). Female mosquitoes acquire the virus when biting an infected bird. The virus must be repeatedly transferred back and forth between infected mosquitoes and

animal reservoirs (usually birds) before it poses a risk to humans (2,3).

Recent findings document that WNV may be transmitted also by blood transfusion and by organ transplants. The transfer of WNV during intrauterine life from mother to developing child is under investigation. These findings are not surprising because the same transfer of a virus appears also in other viral diseases.

### **Mass pesticide spraying is ineffective and dangerous**

Indiscriminate pesticide spraying over an urban area is an ineffective and very dangerous attempt at controlling mosquitoes, and thereby controlling the WNV (4-29). Not only will repeated spraying fail to eradicate the mosquitoes, the spray program leads to the survival of those mosquitoes resistant to pesticides. The resistance is passed on to new generations, leading to endless cycles of increased pesticide spraying each year – the so called “pest mill”. Health officials in New York have already announced that they are planning to continue the spraying repeatedly in future years.

This offer was refused because New York City did not agree to cover future legal expenses against pesticide suppliers from those who develop health problems after mass spraying.

### **D.E.E.T – a mosquito repellent that can cause death in children**

**Even the recommended mosquito repellent D.E.E.T. can have serious repercussions. In 1998, D.E.E.T. was found to cause seizures and even death in children (32,33).**

*SAFE EFFECTIVE WAYS TO CONTROL MOSQUITOES DO EXIST, AS DESCRIBED LATER IN THIS OPEN LETTER.*

## IMPACT OF PESTICIDES ON HUMAN HEALTH

To assess the impact of pesticides on human health, it is not enough to view the aerial and truck spraying in isolation. It is also necessary to take into account all other sources of pesticide exposures as well. The combined effect of these various exposures and their interactions (known as "synergistic effects") can strongly increase the harmful consequences of spraying (5-9).

Pesticide residues are found everywhere -- in the air, water, soil, rain, fog, snow, food, livestock, wildlife, and the body tissues of human beings. Chemical pesticides and other pollutants are constantly being woven into our bodies. They have been detected in the body tissues of **everyone** tested, regardless of country, place of origin, residence, occupation, age, sex or social class (9,18). The only group free of pesticides in their body tissues were certain Indian tribes protected from the rest of the world by the dense umbrella of the Amazon jungle.

- Pesticides have been found surrounding the eggs of infertile Canadian women (9-11).
- A joint United States/Canadian study has detected pesticides in the amniotic fluid surrounding the fetus in one third of human pregnancies (11).
- Pesticides and other pollutants have been detected in the body tissues of children even before their birth, as early as the 16<sup>th</sup> week of pregnancy.

The long term impacts of such exposures are not fully known because throughout the millions of years of our existence, humanity has never been exposed to chemical pesticides.

However it is *known* (5-31, 34-38) that an exposure to chemical pesticide residues, especially a chronic exposure, even at low levels, can cause:

*genetic damage*  
*birth defects*  
*disruption of hormone regulation*  
*defective sexual development*  
*brain damage*  
*Parkinson's disease*  
*allergies*  
*exacerbation of asthma*  
*cancer*  
*and many other health problems.*

**Especially disturbing is the finding that predisposition to cancer and other health problems due to genetic damage related to pesticide exposure may be transmitted by affected individuals not only to their offspring, but also to further generations (9).**

**In a predisposed individual, even a single exposure to pesticides can trigger (4-31, 34-38):**

*latent environmental sensitivities*  
*allergies*  
*chronic fatigue syndrome*  
*behavioural changes such as irritability, anxiety, depression*  
*aggressiveness and personality changes*  
*concentration difficulties, memory and learning problems*  
*hormone disruption*  
*erectile dysfunction*  
*loss of libido*

## **Other Health Problems**

New York Mayor Rudolph Giuliani stated that "Sometimes you've got to make tough choices and people get angry at you. ... The reality is that danger to human life is more important than birds, fish and insects." **What has not been taken into account is that the danger to human health caused by the indiscriminate spraying of pesticides is far greater than the danger of acquiring the WNV from mosquitoes.**

In their book, *Chemical Exposures -- Low Levels and High Stakes* (4), Nicholas Ashford, Ph.D., J.D., associate professor of technology and policy at the Massachusetts Institute of Technology, and Claudia Miller, M.D., state (1):

**"In a survey of 6,800 persons claiming to be chemically sensitive, 80 percent asserted they knew 'when, where, with what, and how they were made ill.'  
Of the 80 percent, 60 percent blamed pesticides."**

## **THE IMPACT OF CHEMICAL PESTICIDES ON THE IMMUNE SYSTEM**

Although some pesticides have been banned or restricted because they were recognized to pose serious threats to human health, so far little attention has been given to what may be the greatest danger of pesticides -- impairment of the human immune system (9-15).

The World Resources Institute's report (15) titled "***Pesticides and the Immune System: The Public Health Risks***," documents the impact of widely used chemical pesticides on the immunity of animals as well as humans. Their conclusion, based on an

extensive body of experimental and epidemiological research from around the world is that:

**Impairment of the immune system by chemical pesticides can lead to allergies, autoimmune disorders such as lupus and cancer. It may also lead to infections to which one may be normally resistant (9-15).**

**In other words, exposure to spraying with chemical pesticides may actually increase the risk of developing WNV encephalitis.**

**Approval for sale does not mean that the pesticide is harmless**

The report by World Resources Institute presents scientific evidence that pesticide-related health problems are much more serious than is generally acknowledged, and that the steps now underway to resolve this issue are far from adequate (15).

In 1999 to quell mosquitoes thought to be carrying WNV, New York City aurally sprayed Fyfanon ULV (malathion), a potential cancer-triggering pesticide. The NY State Department of Environmental Conservation has attributed a 1999 die-off of thousands of fish in Staten Island to malathion poisoning. The spraying campaign subsequently affected the Hudson River, Long Island Sound and the Great South Bay, and has been blamed for causing the largest extermination of lobsters. Roughly eleven million lobsters, 90 percent of the full population, perished. Connecticut and New York lobstermen sued the companies that manufacture and apply the pesticides that were used in the spraying.

In April 1990, the Office of Technology Assessment (OTA) of the US Congress released an extensive report entitled "Neurotoxicity: Identifying and Controlling Poisons of the Nervous System."(16) The two top targets of the report are chemical pesticides and pharmaceutical drugs. The OTA report expresses concern that research projects have not adequately addressed neurotoxicity of these substances – a major issue for the survival of humanity, as we know it:

"... very few new and existing chemicals have been evaluated specifically for neurotoxicity. Of particular concern are the delayed effects of some of the organophosphate pesticides. Organophosphate and carbamate insecticides are the most common causes of agricultural poisonings.

**Malathion, an organophosphate pesticide, can permanently damage the nervous system after only one exposure (16).**

Last year, the pesticides Anvil 10+10 (10% sumithrin, 10% piperonyl butoxide, and 80% "inert" ingredients) and Scourge (resmethrin) were used. Both of these pesticides are Type I synthetic pyrethroids, manufactured in the laboratory to mimic the natural anti-insect pyrethrins extracted from chrysanthemum flowers.

Anvil 10+10 is a relatively new pesticide. There have been few tests of any kind on this product on either animal or human subjects. **Although** Anvil 10+10 and Scourge have been **approved for sale**, this **approval does not mean they are harmless**. According to the U.S. Environmental Protection Agency, neither **Anvil 10+10 nor Scourge have ever been tested for their impact on the immune system because "it has not been required to test for immunity"**(17).

Recent research on pyrethroids has found that their mode of action is similar to chlorinated pesticides such as cyclodienes (chlordane, aldrin, etc.). These pesticides were banned in the

United States in the 1980's due to their dangerous impact on human health and the environment.

### **Breast cancer and pesticides**

A 1998 study by Drs. Joan Garey and Mary S. Wolff of Mount Sinai School of Medicine, New York, found that the chemical **sumithrin**, the main pesticide in Anvil 10+10, disrupts human hormone balance and increases the growth of breast cancer cells in test tubes (40).

The study concluded: "Overall, our studies imply that each pyrethroid compound is unique in its ability to influence several cellular pathways. These findings suggest that pyrethroids should be considered to be hormone disruptors, and their potential to affect endocrine function in humans and wildlife should be investigated" (40).

### **The inability to prevent the spread of chemicals in nature**

Once pesticides and other chemicals are released into the environment, their spread cannot be controlled. For example, radioactively traced pesticides sprayed over the UK were detected five to seven days later in the southern USA; traces of insecticides used in tropical areas were detected in the Arctic (20). Global air currents, hurricanes, etc., can transport pesticides and other chemicals even to other hemisphere (9,20).

The inability to contain the impact of chemical weapons to a desired geographical area was recognized already during World War I and was the main reason why, after World War I, the use of chemical weapons was banned by international agreement. (This fact is, unfortunately, generally not remembered.)

It is estimated that 6 to 15 percent of the population is chemically sensitive. If only 10 percent of a 10 million population would be chemically sensitive, the number of people potentially affected by chemical pesticides, such as Anvil 10+10 and Scourge, (which have a tendency to cause allergies and neurological problems), could reach 1 million people.

To this 1 million potentially affected people must be added an additional unknown number of elderly, those with impaired immunity (patients with AIDS, cancer, etc) and children as well as future offspring of pregnant women who may be negatively affected by residual traces of pesticides while in the womb. Both these groups may become sensitized and may develop adverse reactions ranging from mild to life threatening.

Considering the cumulative, multigenerational, and destructive impact of pesticides, especially on children's development and behaviour, **it is frightening to imagine the delayed consequences of repeated pesticide spraying for those who have allergies or weakened immune systems, for those who are chemically sensitive, as well as for children and future generations.** (6-16, 18-31, 34-38)

All life forms including humans are vulnerable to toxic effects of pesticides

Cells are the basic structural unit of plants, insects, animals and human beings. Despite the large differences in function and shape of our cells, we share the same basic cell blueprint, including the same basic biochemical metabolic processes, with other living organisms, including mosquitoes.

Each cell – whether from a plant or an insect or an animal – is a microscopic bag with a nucleus (apart from red cells), containing chromosomes in the form of DNA, and a fluid material called cytoplasm. The cell is surrounded by a

membrane -- an "outer skin" -- and contains additional specialized structures such as mitochondria for the generation of energy.

Children's special vulnerability to pesticides was first widely publicized by the National Research Council (NRC) in their 1993 report *Pesticides in the Diets of Infants and Children*. The National Research Council concluded that children are not adequately protected from pesticides for the following reasons (39):

- children are exposed to pesticides even during their prenatal development, because the pesticides and other pollutants are shifted from the bodies of their mothers through placenta to their body tissues;
- after birth, children receive daily pesticide residues in breast milk and, later, through food, water and other sources – along with other harmful pollutants;
- on average, children receive more pesticides per body weight than adults because, for their size they consume more calories, drink more water (frequently contaminated by pesticides) and eat more fruit and vegetables (commonly sprayed), and breathe more air;
- in addition, the impact of pesticides is especially destructive in children because the activity of their enzymes is not yet functioning fully. Therefore, they have even more difficulty in eliminating toxic substances than adults.

The National Research Council recommended changes in the regulation of pesticides. Many of these changes were included in a 1996 law (the Food Quality Protection Act (FQPA), but have yet to be fully implemented (39).

## II. SAFE APPROACH

It is urgent to educate the general public, media and decision makers that chemical pesticides, including those used to prevent WNV encephalitis, cause much more health damage and are much more harmful to human health than the extremely small health risk presented by WNV.

Comment: LAG to dream up something here, overnite.

There are safe approaches that can be used to control and prevent WNV encephalitis.

Nevertheless, we need to develop and re-discover safe approaches for the control of pests including mosquitoes.

There are safer, more effective ways than the use of chemical pesticides, to control mosquitoes. These methods include, among others, biological (e.g. dragonflies and goldfish, both commercially available), natural repellents, the disruption of mosquito breeding cycles by removing stagnant water, etc.

As recommended by New York City Department of Health: products such as **Mosquito Magnets are safe natural mosquito repellents.**

Among natural mosquito repellent products are those containing herbal extracts and oils such as *Nature 99 Herbal Extract*, which is a natural repellent containing essential oils from the twigs and leaves of the *Eucalyptus Citriodora* plant which has an extraordinarily high content of citronella. Other natural products include *Royal Neem* (a blend of herbs, essential oils and aloe), *Nature's Body Guard*, *Zetastop* and *Mosquitoex*.

## **Mosquito Control – Some Ideas for Alternative Management**

### **All chemical pesticides are harmful to humans**

As stated by Environment Canada, "Pesticides are designed to kill ... chemical pesticides are harmful to humans". For this reason, the indiscriminate mosquito spraying must be stopped and the unnecessary use of chemical pesticides needs to be abandoned and outlawed.

### **Human Right to a pollution free environment**

In April 2001 the UN Commission on Human Rights proclaimed the HUMAN RIGHT TO A POLLUTION FREE ENVIRONMENT: "Everyone has the right to live and die in the world free from toxic pollution and environmental degradation".

We need to develop and rediscover safe approaches for the control of mosquitoes, which are safer and more effective than chemical pesticides. Combining approaches that prevent and disrupt mosquitoes not only avoid damage to human health and ecosystem, but will also avert highly expensive litigation's brought about by the current spraying program and the high expenses for such spraying.

### **Some natural alternatives to mosquito spraying**

- Disrupting mosquito breeding cycles by removing stagnant water as recommended by the NYC Department of Health.
- Vitamin B1 (or brewers yeast): from many anecdotal evidences (including own personal experiences), – it can be taken orally, or dissolved in water and be put into a dish to slowly evaporate to repel mosquitoes in the surrounding area, or it can be sprayed on clothes to repel mosquitoes.

- Increase a number of natural mosquito predators: such as using dragonflies (available commercially) in stagnant waters, gold fish, birds (possible project for school children to make bird houses for parks, schools and backyards).
- Natural barriers – growing plants like catnip and lemon grass to repel mosquitoes
- Use of natural repellents such as Mosquito Magnet, herbal extracts or essential oils e.g. from Eucalyptus Citridora plant, which has an extraordinary high content of citronella. Other products include Royal Neem (mixture of essential oils and aloe), Nature's BodyGuard, Zatastop and Mosquitoex, just to name a few

## Conclusion

As stated by Environment Canada: "chemical pesticides are deliberately made to be poisonous in order to kill or slowly destroy undesirable forms of life". Because we share the common basic cellular and biochemical blueprint with other life forms, synthetic chemical pesticides produce "toxic broad spectrum" impacts, damaging or killing various useful insects, animals, and plants as well as damaging human health.

**The use of chemical pesticides started about fifty years ago. The chemical pesticides that were once touted as being a "wonderful, safe approach" to pest control are now known to contaminate everything, soil, food, water, air, rain, all living forms including our bodies and the bodies of our children, even before their birth. They are destroying our ecosystem -- and us.**

If we do not stop the indiscriminate use of pesticides, we will continue to endanger our environment and the quality of our own health and more crucially, the healthy physical and mental development of our children and future generations.

The indiscriminate mosquito spraying must be stopped and the unnecessary use of chemical pesticides needs to be abandoned and outlawed.

Such an action will benefit everyone including all stakeholders and their families – we all live on the same planet

Signed,

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*This Open Letter is distributed by Staten Island Citizens for Healthy Alternatives (SICHA), the No Spray Coalition, and SAFE NYC.*

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A combination of the dramatic response in the media, lack of experiences of present generations of North American health professionals with epidemics other than AIDS, undoubtedly, have contributed to the over-blown and fearful response to this relatively insignificant virus. Thousands of people carrying antibodies against WNV never experienced any kind of symptoms although they were exposed to the virus.

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Comment: To be re done

An Open Letter by Concerned Scientists and Physicians

"Friendly Fire" Pesticides More Dangerous than West Nile virus, public health and legal ramifications

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# AN OPEN LETTER BY CONCERNED PHYSICIANS AND SCIENTISTS

## *STOP THE INDISCRIMINATE SPRAYING OF "FRIENDLY FIRE" PESTICIDES*

**Re:** INDISCRIMINATE AND MASSIVE SPRAYING AGAINST MOSQUITOES  
CARRYING WEST NILE VIRUS — PUBLIC HEALTH, LEGAL, AND  
OTHER RAMIFICATIONS.

**SUMMARY:** INDISCRIMINATE AND UNNECESSARY SPRAYING OF "FRIENDLY FIRE" PESTICIDES, ESPECIALLY IN HEAVILY POPULATED URBAN AREAS, IS FAR MORE DANGEROUS TO HUMAN HEALTH AND THE NATURAL ENVIRONMENT THAN WEST NILE VIRUS.

THE HEALTH OF MANY PEOPLE IS DETERIORATING AND WILL FURTHER DETERIORATE, SOMETIMES SERIOUSLY, AS A RESULT OF EXPOSURE TO "FRIENDLY FIRE PESTICIDES" USED IN THE CHEMICAL WAR AGAINST MOSQUITOES. THOSE WHO ARE ESPECIALLY VULNERABLE INCLUDE CHILDREN, THE OFFSPRING OF PREGNANT WOMEN, CHEMICALLY SENSITIVE OR IMMUNOSUPPRESSED INDIVIDUALS, SUCH AS PATIENTS WITH AIDS AND CANCER, AND THOSE SUFFERING WITH ASTHMA AND OTHER ALLERGIES. THERE SHOULD BE WIDESPREAD AWARENESS OF THE FAR-REACHING PUBLIC HEALTH, ECONOMIC AND LEGAL RAMIFICATIONS OF SUCH MASSIVE SPRAYING. THERE ARE OTHER, SAFE APPROACHES THAT CAN BE USED TO ADDRESS THIS ISSUE.

We, the undersigned physicians and scientists, have a particular interest in the impact of chemical pesticides on human health, and in ensuring that there is a proper widespread awareness about this issue.

**We want to alert everyone to the little known data published in peer reviewed scientific journals which has far reaching public health and legal consequences.**

Our grave concern lies with the fact that **resorting to a mass spraying** program to protect the population against mosquitoes

carrying the West Nile virus exposes millions of people to "friendly fire" pesticides. The health impact of such spraying affects not only those living in the area, but may potentially affect visitors as well. It has been recognized that even a single exposure can trigger manifestation of clinical symptoms in predisposed individuals. These include those living in the area as well as transient visitors passing through. This program **poses much more danger to human health than the extremely small health risk presented by the West Nile virus itself. Even people bitten by an infected female mosquito, the carrier of this virus, run very little risk of serious illness.**

- **According to the Centers for Disease Control (CDC) Atlanta, the chances of a mosquito bite resulting in West Nile virus infection and serious illness are extremely low (1).**
- The New York City Department of Health *Question and Answer Bulletin* advises that, ***"very few mosquitoes -- perhaps only one out of 1,000 -- are infected. Even if you are bitten by an infected female mosquito, your chances of developing illness are roughly one in 300"*** (2).

If symptoms do develop, they are usually mild and include headaches, muscle aches, skin rashes and swollen lymph glands. More serious infections may cause headaches with high fever. It is extremely rare for a person to develop encephalitis (1,2). Almost all people who developed West Nile virus encephalitis in New York City and the surrounding areas in 1999 (62 people, seven died) and 2000 (11 people, one died) were elderly and immunosuppressed.

Furthermore, **even in those cases where death was attributed to West Nile virus infection, the cause of death in these cases may not be West Nile virus.** West Nile virus positively could be a coincidental finding. In other words, the **cause of death may have been some disease process unrelated to the West Nile virus. Hundreds of individuals who had no symptoms tested positive for West Nile virus antibodies, proving that they were exposed to the virus. They never became ill; and until they were tested, they did not even know that they had been exposed to the virus (3).**

Compared to thousands of people who die each year of the flu (approximately 2,500 in the New York City metropolitan area alone), or the number of children who die of asthma, the number of people who tested positive for West Nile virus and died of encephalitis -- eight people in the last two years combined -- is extremely small.

### ***THE VIRUS IS NOT TRANSMITTED FROM PERSON TO PERSON.***

West Nile virus is transmitted to humans by mosquitoes, not from person to person. Female mosquitoes acquire the virus when biting an infected bird. The virus must be repeatedly transferred back and forth between infected mosquitoes and animal reservoirs (usually birds) before it poses a risk to humans.

### ***INEFFICACY OF PESTICIDE SPRAYING***

Indiscriminate pesticide spraying over an urban area is an ineffective and very dangerous attempt at controlling mosquitoes, and thereby controlling the West Nile virus (4-29). Not only will repeated **spraying fail to eradicate the mosquitoes**, the spray program **leads to the survival of those mosquitoes resistant to pesticides**. This resistance is passed on to new generations, leading to **endless cycles of increased pesticide spraying each year**. Health officials in **New York** have already announced that they are **planning to continue the spraying repeatedly in future years**.

### ***SAFE EFFECTIVE WAYS TO CONTROL MOSQUITOES DO EXIST***

Ironically, these "friendly fire" pesticides are most dangerous to the same group of people for whose protection the spraying is being conducted: **those with weakened immune systems, small children, and the elderly**. Additionally, the impact of spraying is especially harmful to **chemically sensitive** people, those suffering from asthma and other allergies, and to the offspring of pregnant women.

Even the recommended mosquito repellent D.E.E.T. can have serious repercussions. In 1998, D.E.E.T. was found to cause seizures and even death in children (3,30).

There are **safer, more effective** ways than using chemical pesticide use to control mosquitoes. These methods **include disrupting mosquito breeding cycles** by removing stagnant water, etc., as recommended by New York City Department of Health; safe **natural mosquito repellents**, etc.

Among natural mosquito repellent products containing herbal extracts and oils is *Nature 99 Herbal Extract*, a natural repellent containing essential oils from the twigs and leaves of the Eucalyptus Citriodora plant which has an extraordinarily high content of citronella. Other natural products include *Royal Neem* (a blend of herbs, essential oils and aloe), *Nature's Body Guard*, and *Zetastop*. **Combining these approaches will not only avoid damage to human health and the ecosystem, but it will also avert litigation and the economic consequences brought about by the current program.**

### **IMPACT OF PESTICIDES ON HUMAN HEALTH**

To properly **assess the impact of pesticides** on human health, it is not enough to view the aerial and truck **spraying** in isolation. It is necessary to take into account all **other sources of pesticide exposure** as well. The combined effect of these various exposures and their interactions (known as "**synergistic effects**") can strongly increase the harmful consequences of spraying (9).

Pesticide residues are found everywhere -- in air, water, soil, rain, fog, snow, food, livestock, wildlife, and human beings. Chemical pesticides and other pollutants are constantly being woven into our bodies. They have been detected in the body tissues of **everyone** tested, regardless of country, place of origin, residence, occupation, age, sex or social class.

A United States/Canadian study has detected pesticides in the amniotic fluid surrounding the fetus in one third of human pregnancies (31). Pesticides and other pollutants have also been

detected in the **body tissues of children even before their birth and in the fluid surrounding the eggs of infertile Canadian women** (9). The long term and future impact of such exposure is not fully known because throughout the millions of years of our existence, humanity had never been exposed to chemical pesticides until recently.

However it *is known* that exposure to chemical pesticide residues, especially chronic exposure, even at low levels, can cause:

- genetic damage*
- birth defects*
- disruption of hormone regulation*
- defective sexual development*
- brain damage*
- Parkinson's Disease*
- multiple sclerosis*
- allergies*
- exacerbation of asthma*
- cancer*
- and many other health problems.*

Especially disturbing is the finding that **cancer, genetic damage and other health problems** related to pesticide exposure may be **transmitted** by affected individuals not only to their offspring, but also **to further generations** (9).

**Even a single exposure to pesticides can trigger:**

- latent environmental sensitivities*
- allergies*
- chronic fatigue syndrome*
- behavioral changes such as irritability, anxiety, depression, aggressiveness and personality changes*
- concentration difficulties, memory and learning problems*
- hormone disruption*
- erectile dysfunction*
- loss of libido*
- other health problems (4-29).*

New York Mayor Rudolph Giuliani stated that "Sometimes you've got to make tough choices and people get angry at you. ... The reality is that danger to human life is more important than birds, fish and

insects." What has not been taken into account is that the danger to human health caused by the indiscriminate spraying of pesticides is far greater than the danger of acquiring viral encephalitis from mosquitoes.

In their book, *Chemical Exposures -- Low Levels and High Stakes* (4), Nicholas Ashford, Ph.D., J.D., associate professor of technology and policy at the Massachusetts Institute of Technology, and Claudia Miller, M.D., state:

***"In a survey of 6,800 persons claiming to be chemically sensitive, 80 percent asserted they knew 'when, where, with what, and how they were made ill.' Of the 80 percent, 60 percent -- almost half of those who replied -- blamed pesticides."***

### **THE IMPACT OF CHEMICAL PESTICIDES ON IMMUNITY**

Although some pesticides have been banned or restricted because they were recognized as posing serious threats to human health, so far **little attention has been given to what may be the greatest danger of pesticides -- impairment of the human immune system** (32).

The World Resources Institute's report ***"Pesticides and the Immune System: The Public Health Risks,"*** (32) documents the impact of widely used chemical pesticides on the immunity of animals as well as humans. Their conclusion, based on an extensive body of experimental and epidemiological research from around the world is that: **Impairment of the immune system by chemical pesticides can lead to allergies, autoimmune disorders such as lupus and cancer. It may also lead to infections to which one may be normally resistant (9,32). In other words exposure to spraying with chemical pesticides may actually increase the risk of developing West Nile virus encephalitis.**

The World Resources Institute presents scientific evidence that pesticide-related health problems are much more serious than what is generally acknowledged, and that the steps now underway to resolve this issue are far from adequate (32).

In 1999, to quell mosquitoes thought to be carrying West Nile virus, New York City aerially sprayed Fyfanon ULV (malathion), a potential cancer-triggering pesticide. The NY State Department of Environmental Conservation has attributed a 1999 die-off of thousands of fish in Staten Island to Malathion poisoning. The spraying campaign subsequently affected the Hudson River area, the Long Island Sound and the Great South Bay, and has been blamed for causing the largest mass extermination of lobsters in history. Roughly eleven million lobsters, 90 per cent of the full population, perished. Connecticut and New York lobstermen plan to file suit against the companies that manufacture and apply the pesticides used in spraying. Seventy five million dollars is being sought in compensatory damages. The lawsuit is the culmination of nine months of research conducted by a group of scientists.

Last year, the pesticides Anvil 10+10 (10 percent Sumithrin, 10 percent piperonyl butoxide, and 80 percent "inert" ingredients) and Scourge (Resmethrin) were used. Both of these pesticides are Type I synthethic pyrethroids, manufactured in the laboratory to mimic the natural anti-insect pyrethrins extracted from chrysanthemum flowers.

Anvil 10+10 is a relatively new pesticide. There have been few tests of any kind on this product on either animal or human subjects. Although both Anvil 10+10 and Scourge have been approved for sale, this approval does not mean they are harmless. According to the U.S. Environmental Protection Agency, neither **Anvil 10+10 nor Scourge has ever been tested for their impact on the immune system because "it has not been required to test for immunity"** (33).

Recent research on pyrethroids has found that they have a mode of action similar to chlorinated pesticides such as cyclodienes (chlordan, aldrin, etc.). These pesticides were banned in the United States in the 1980's due to their dangerous impact on human health and the environment.

A 1998 study by Drs. Joan Garey and Mary S. Wolff of Mount Sinai School of Medicine, New York, found that the chemical **Sumithrin, the main pesticide in Anvil 10+10**, disrupts human hormone balance and has been **shown to increase the growth of breast cancer cells in test tubes** (34).

The study concluded: "Overall, our studies imply that each pyrethroid compound is unique in its ability to influence several cellular pathways. These findings suggest that pyrethroids should be considered to be hormone disruptors, and their potential to affect endocrine function in humans and wildlife should be investigated" (36).

### **PANDORA'S BOX**

Once pesticides and other chemicals are released into the environment, their spread cannot be controlled. For example, radioactively traced pesticides sprayed over the UK were detected five to seven days later in the southern USA; traces of insecticides used in tropical areas were detected in Arctic trees (35). Global air currents, hurricanes, etc., can transport pesticides and other chemicals even to other hemisphere (6,32).

The inability to contain the impact of chemical weapons to a desired geographical area was recognized already during World War I and was the main reason why, after World War I, the use of chemical weapons was banned by international agreement. (This fact has been subsequently forgotten.)

**It is estimated that 6 to 15 per cent of the population is chemically sensitive. If only 10 per cent of an 8 million population would be chemically sensitive, the number of people potentially affected by chemical pesticides, such as Anvil 10+10 and Scourge, which have a tendency to cause allergies and neurological problems, could reach eight hundred thousand people.**

**To these eight hundred thousand potentially affected people must be added an additional unknown number of children as well as the offspring of pregnant women who may be negatively affected by residual traces of pesticides while in the womb. Both these groups may become sensitized and may develop adverse reactions ranging from mild to life threatening.**

**Considering the cumulative multigenerational destructive impact of pesticides, especially on children's development and behavior, it is frightening to imagine the delayed consequences**

of repeated pesticide spraying for those who have allergies or weakened immune systems, for those who are chemically sensitive, as well as for our children and future generations.

**ALL LIFE FORMS INCLUDING HUMANS ARE VULNERABLE TO TOXIC EFFECTS OF PESTICIDES**

Cells are the basic structural unit of plants, insects, animals and human beings. Despite the large differences in function and shape of our cells, we share the same basic cell blueprint, including the same basic biochemical metabolic processes, with other living organisms, including mosquitoes.

*Each cell – whether from a plant or an insect or an animal - is a microscopic bag with a nucleus (apart from red cells), containing chromosomes in the form of DNA, and a fluid material called cytoplasm. The cell is surrounded by a membrane -- an "outer skin" -- and contains additional specialized structures such as mitochondria for the generation of energy.*

Children's special susceptibility to pesticides was first widely publicized by the National Research Council (NRC) in their 1993 report *Pesticides in the Diets of Infants and Children*. The NRC concluded that children are not adequately protected from pesticides:

- **Children are exposed to pesticides early during their prenatal development** when the pesticides and other pollutants are shifted from the bodies of their mothers through placenta to their body tissues.
- They then receive an additional load through **breast milk** and later through the **food**.
- On average, children receive greater exposure to pesticides because they consume, for their size, **more calories, drink more water** (frequently contaminated by pesticides) and **eat more fruit and vegetables (which are commonly sprayed)**, and **breathe more air** than adults.
- **Children's metabolic systems are still immature**, their enzymes, livers and kidneys have **difficulties eliminating toxic substances**.

The NRC recommended changes in the regulation of pesticides. Many of these changes were included in a 1996 law (the Food Quality Protection Act (FQPA)), but have yet to be fully implemented.

### **SAFE APPROACH**

An effort must be made to develop and rediscover the safe approaches to the control of pests including mosquitoes. **There are safer, more effective ways than pesticide use to control mosquitoes**, such as disrupting mosquito breeding cycles by removing stagnant water; the use of products such as Mosquito Magnet, safe natural mosquito repellents, (or less ideally, BTI approach - *Bacillus thuringiensis v. israelis* which should not be sprayed in the cities due to potential impact on human health). Such approaches will not only **avoid damage to human health and ecosystem**, but **will also avert litigation**.

The use of chemical pesticides started about fifty years ago. The chemical pesticides that were once touted as being a "wonderful, safe approach" to pest control are now known to contaminate our bodies and the bodies of our children, even before their birth. They are destroying our ecosystem -- and us.

**Chemical pesticides are deliberately made to be poisonous in order to kill or slowly destroy undesirable forms of life. However, because we share the common basic cellular and biochemical blueprint with other life forms, chemical pesticides produce "toxic broad spectrum" impacts, damaging or killing various useful insects, animals, and plants as well as damaging human health.**

**If we do not stop the indiscriminate use of pesticides, we will continue to endanger the quality of our own health and more crucially, the healthy physical and mental development of our children and future generations.**

**As stated by Agriculture Canada "Pesticides are designed to kill... All chemical pesticides are harmful to humans.**

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**For this reason, the indiscriminate and unnecessary use of chemical pesticides needs to be abandoned and outlawed.**

Signed,

(Please see next page)

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## ADDITIONAL COMMENTS

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- A study done by the Roger Williams General Hospital, Brown University: This study on pyrethroids concludes: "Chronic exposure of humans or animals to pesticides containing these compounds may result in disturbances in endocrine effects." [Journal of Steroid Biochemistry, March 1990, volume 35, issue 3-4, pages 409-414];
- Cambridge University: A report issued in June 2000 by the Royal Society in England and written by a group from Cambridge University called for international cooperation to deal with the dangers posed by endocrine disrupting chemicals, including pyrethroids, and recommends reducing human exposure to these chemicals. There are also links between insecticides and reduction of testosterone levels in men:
- University of Greifswald: Several pesticides used as herbicides, insecticides and fungicides known to be endocrine disrupting chemicals were examined in this series of German studies. Acute and chronic pesticide exposure led to changes in sex hormone concentrations, with concentrations of testosterone decreasing one day after acute exposure. These studies found "a hormonal and immune suppression after acute exposure." ["Disruption of male sex hormones with regard to pesticides," Toxicology Letters, June 30, 1999; 107(1-3):225-31]; Also, see links between pyrethroids and childhood brain cancers:
- A study of pesticides and childhood brain cancers has revealed a strong relationship between brain cancers and compounds used to kill fleas and ticks, according to a report published in Environmental Health Perspectives. The study concludes "The specific chemicals associated with children's brain cancers were pyrethrins and pyrethroids (which are synthetic pyrethrins, such as permethrin, tetramethrin, allethrin, resmethrin and fenvalerate) and chlorpyrifos (trade

name: Dursban)." [Janice M. Pogoda and Susan Preston Martin, "Household Pesticides and Risk of Pediatric Brain Tumors," Environmental Health Perspectives, vol. 105, no. 11 (November 1997), pages 1214-1220.] The EPA, in June 2000, halted sales of Dursban. And, links between pyrethroids and neurological damage:

- Several studies have indicated neurological damage resulting from exposure to pyrethroids, and some of the damages have been found to be long term. Ludwig Maximilians University: This study, conducted by the Physiological Institute at Ludwig Maximilians University in Munich, Germany, found that although "a majority of complaints following an acute pyrethroid intoxication disappeared after the end of exposure," several effects were still seen in patients after more than two years. Among these long term symptoms were "(1) cerebro organic disorders (reduced intellectual performance with 20%-30% reduction of endurance during mental work, personality disorder), visual disturbances, dysacusia, tinnitus; (2) sensomotor polyneuropathy, most frequently in the lower legs; (3) vegetative nervous disorders," including increased heat sensitivity and reduced exercise tolerance due to circulatory disorder. The study concludes "Many of these patients exhibit pathological autoimmune diagnostical findings and developed autoimmune diseases." [Toxicology Letters, 1999 June 30;107(1 3):161-76.];
- Uppsala University: This study, conducted by the Department of Environmental Toxicology at Uppsala University in Sweden studied mice, not humans, but found that "low dose exposure" to pyrethroids "resulted in irreversible changes in adult brain function in the mouse" when exposed during the growth period. This occurred at levels of exposure less than what was found to affect adult mice. The study also found "neonatal exposure to a low dose of a neurotoxic agent can lead to an increased susceptibility in adults to an agent having a similar neurotoxic action, resulting in additional behavioral disturbances and learning disabilities." [Neurotoxicology, 1997;18(3):719-26.]

- Northwestern University Medical School: A series of investigations conducted at Northwestern's Department of Molecular Pharmacology and Biological Chemistry in Chicago, has found neurological damage from pyrethroids. One study, conducted by international expert Toshio Narahashi, finds nervous system damage from pyrethroids to be comparable to DDT. This study found that "Detailed voltage clamp and patch clamp analyses have revealed that pyrethroids and DDT modify the sodium channel to remain open for an extended period of time." The result of this damage is "potent effects on the nervous system." ["Nerve membrane ion channels as the target site of environmental toxicants," Environmental Health Perspectives, 1987 April;71:25-9.];
- A separate study found that pyrethroids cause "membrane depolarization, repetitive discharges and synaptic disturbances leading to hyperexcitatory symptoms of poisoning in animals." This study found that only 1% "of sodium channel population is required to be modified by pyrethroids to produce severe hyperexcitatory symptoms." ["Neuronal ion channels as the target sites of insecticides," Pharmacol Toxicology, 1996 July;79(1):1-14.];
- Links between pyrethroids and thyroid damage: A study conducted by four scientists on a variety of pesticides found a connection to thyroid damage, although this study was conducted on rats and not on humans. The study concludes "exposure to organochlorine, organophosphorus, and pyrethroid insecticides for a relatively short time can suppress thyroid secretory activity in young adult rats." The study also said a decrease in body weight seen "suggests that pyrethroid insecticides can inhibit growth rate." [Journal of Applied Toxicology, vol. 16, no. 5, pages 397-400, 26 references, 1996.] For comprehensive review of information on Malathion, see Loretta Brenner, Journal of Pesticide Reform, Volume 12, Number 4, Winter 1992. Northwest Coalition for Alternatives to Pesticides, Eugene, OR. Also, J Exp Zool 1999 Aug 1;284(3):355-9, "Morphological alterations in mouse testis by a single dose of malathion."

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Contreras HR, Bustos Obregon E Physiology and Biophysical Program, Institute of Biomedical Sciences, University of Chile, Santiago 7, Chile; and J Wildl Dis 1999 Jul;35(3):536-41, "Effects of malathion on disease susceptibility in Woodhouse's toads." Taylor SK, Williams ES, Mills KW, Department of Veterinary Sciences, University of Wyoming, Laramie 82070, USA. In these two 1999 animal studies (which were done subsequent to Brenner's review), one shows that a single dose of malathion impaired the resistance of frogs to infection. The other shows that a single dose of malathion damaged sperm and other cells of the male reproductive system in mice. Studies like these raise a red flag with regard to human exposure -- even one time exposure.

*This Open Letter is distributed by  
Staten Island Citizens for Healthy Alternatives (SICHA),  
the No Spray Coalition,  
SAFE NYC, and  
The Coalition for Alternatives to Pesticides (CAP), Québec,  
Canada.*

*Refer all questions and comments to:*

*Katherine Barbera, (SICHA) (718) 273-5489  
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*Re: The personal, legal and other ramifications of Bill 15 (cont'd)*

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Date \_\_\_\_\_

Mr. (name of decision maker)

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Address line 2

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Dear (name of decision maker)

**Re: The personal, legal and other ramifications of Bill 15**

**We, the undersigned physicians and scientists, have a particular interest in the impact of chemical pesticides on human health and the environment. The reason for writing you this letter is our deep concern regarding **Bill 15** and its far reaching **serious health, ecological, environmental, financial and legal ramifications. Undoubtedly the legal consequences would be much more serious than in the AIDS and hepatitis C tainted blood lawsuits, because the mass spraying will expose millions of people to the risk of health damage – not just residents of and travelers to Québec but also other Canadians as well as Americans.****

*Re: The personal, legal and other ramifications of Bill 15 (cont'd)*

In its April 2001 statement, the UN Commission on Human Rights concluded that **"everyone has the right to live and die in a world free from toxic pollution and environmental degradation"** and the UN Environment Programme proclaimed that, "It is time to recognize that those **who pollute or destroy the natural environment** are not just **committing a crime** against nature, but are **violating human rights as well.**" Bill 15 will draw **international criticism** for denying this right. Additionally Bill 15 would lead to **a loss of popularity of the Quebec government** by its constituents, who may perceive this Bill as an expression of dictatorship.

Much effort and money have been devoted to the development of a programme for the prevention of the spread of the West Nile Virus. Since the polio epidemic, apart from AIDS, there has been no major epidemic on this continent for the last almost half a century. Thus, the present generation including the **medical community have not had personal experience in dealing with epidemics.**

Apparently for this reason, those who participated in preparing West Nile Virus prevention programme **did not analyze the pattern of previous outbreaks to utilize data from West Nile Virus outbreaks in other countries.**

The worldwide spread of **AIDS**; the widely publicized drastic measures to suppress the recent European **hoof (foot) and mouth disease**; the possibility of a looming threat of the widespread **"mad cow" disease**; the **dramatization by the press of the West Nile Virus threat**, **"fear of the unknown"** and **practically no information in medical literature on the health impact of chronic exposure to pesticide residues** have contributed, apparently to a great degree, to the decision to use such drastic measures as amending the Human and Animal Health Protection Acts and replace them with Bill 15.

**The lack of information in medical literature on this crucial health issue reinforces the false impression that there is no special danger to human health from the use of pesticides. Because physicians are not adequately trained to recognize the link between pesticides and related health problems they frequently and mistakenly assure their patients (including those who are decision makers) not to worry because there are no reports in medical literature on the existence of any health problem related to pesticide residues. However, the lack of reporting does not mean that exposure to pesticide residues is harmless to human health.**

Obviously, these factors, along with the **erroneous belief that chemical pesticide spraying would protect the population against mosquitoes** carrying the West Nile Virus (and would lead, therefore, to the prevention of West Nile Virus encephalitis)

together with the desire for a “quick fix” approach, have been the basic reasons for formulating Bill 15.

Unfortunately, certain important facts were not taken into account.

- **We share a basic life blueprint with other life forms, including mosquitoes.**
  1. Our bodies are similar to mosquitoes (and other life forms) in that we are built from structural building blocks, called **cells**. These cells, although seemingly markedly different, have the same basic features: nucleus (apart from red cells), cytoplasm, mitochondria, cell membrane, etc.
  2. Also, the main **biochemical processess** in our bodies are basically similar to other living forms. The similarity is such that, for example, bacteria are used for assessing how a tested substance may be metabolized in the human body.
  3. Chemical **pesticides are made deliberately poisonous to kill or slowly destroy undesirable forms of life** such as mosquitoes. For this reason chemical pesticides can also kill or damage other life forms including the health of humans, especially of children. As stated by Environment Canada, “pesticides are also **harmful to humans**” ... and pets.

*In the past, studies focused on workers occupationally exposed to pesticides and populations in third world countries where exposure was high due to overuse of pesticides. Nowadays, however, pesticides are detected in the body tissues of EVERYONE tested, regardless of country, place of origin, residence, type of work, age, sex or social class.*

*Because pesticides are widely used in many places including hotels, airplanes, and other public places, it becomes evident, that nobody, not even celebrities and decision makers, can escape the health impacts of exposure to these toxic substances; we all breathe the same air.*

*For illustration, Pierre Trudeau, as well as Pope John Paul II, were both diagnosed with Parkinson's Disease; Ronald Reagan, the former USA President, with Alzheimer's Disease; Mrs. Nancy Reagan and Mrs. Betty Ford both suffered breast cancer; and Jackie Kennedy Onassis died of lymphoma. **There is a link between pesticides exposure and Parkinson's Disease, breast cancer, lymphoma and probably certain cases of Alzheimer's Disease.** Many other health problems, including breast cancer, cancer of the testicles (“the cancer of young men”) and increasingly frequent cancer of the prostate affecting a growing number of men including those in decision making positions, are also linked to pesticides exposure.*

- Today **everyone** carries in his/her body tissues a so-called “**body chemical burden.**” The final impact of such “body chemical burden” is dependent on many factors, known and unknown, and cannot be predicted. It can cause acute and especially delayed health consequences such as **allergy, immunotoxicity, neurotoxicity, genetic damage, cancer, and other health problems.**
- **Mass spraying** with chemical pesticides will result in exposing millions of people to potentially **serious health consequences, including impairment of the immune system.**
- The World Resources Institute report entitled, “Pesticides and the Immune System: The Public Health Risks” presents **scientific evidence that pesticide-related health problems are much more serious than is generally acknowledged, especially their impact on immunity.**
- The report also states that the steps now underway to resolve this issue are far from adequate.” ... “**Impairment of the immune system** by chemical pesticides can lead to **allergies, autoimmune disorders such as lupus and cancer.** It may also lead to **infections to which one may normally be resistant.**” In other words, exposure to spraying with chemical pesticides may actually **increase the risk of developing West Nile Virus encephalitis.**
- **Once chemicals, including pesticides, are released into the environment, their spread cannot be controlled.** Pesticides are widely dispersed in the environment and are further spread mainly by air, water, rainwater and the food chain. They have been detected **in human and animal body tissues** at locations **thousands of miles from their initial application.** For example, radioactively traced pesticides sprayed aerially over the UK were detected five to seven days later in southern parts of the USA; the pesticides used in the tropical areas have been detected in Arctic vegetation. The health impact, therefore, of such **spraying may also affect those living in far distant places and travelers.** It has been well documented that even a **single exposure** to chemical pesticides **can trigger health problems** in predisposed individuals.
- **Compared to the number** of those that died of other more common health problems, such as the number of New York people **who died of flu or children who died of asthma, the number** of those that **died of West Nile Virus encenphalitis** – all of them elderly and apparently immunocompromised - seven victims in a population of 10 million in 1999 and two victims in a population area of 18 millllion in 2000 - is **an extremely small number.**
- The common pattern of **West Nile Virus epidemics** is represented by a **peak in the first year and decline and disappearance** of cases usually **in the second year** (please see enclosed information). The West Nile Virus outbreak in the New York area has been following a similar pattern.

*Re: The personal, legal and other ramifications of Bill 15 (cont'd)*

- The spraying will also lead to additional problems such as the **contamination of organic farming, underground water, rivers and damage to aquatic and wild life.**
- Amongst the additional consequences of spraying with chemical pesticides (the so-called "**pesticides mill**") is the survival of the **mosquitoes** that will develop **resistance to the pesticides**; and **increased numbers of mosquitoes** because the number of their predators will be reduced by exposure to the pesticides.
- Especially disturbing is the finding that such **health damage** may also be **transmitted to children** of the affected individuals, **and to subsequent generations.**
- The mass spraying will also lead to many other far-reaching **ramifications** – **ecological, environmental, economic, financial and legal litigations.**

To conclude, we cannot overstress the legal and other consequences of Bill 15. **Bill 15 possess much more danger to public health than the extremely small health risk presented by West Nile Virus.** As can be seen in the enclosed material (which is based upon the statements issued from Centers for Disease Control Atlanta and New York City Department of Health) the risk to contract West Nile Virus encephalitis is extremely small and effects only the elderly, especially those with impaired immunity.

**As mentioned previously, undoubtedly the legal consequences would be much more serious than in the AIDS and hepatitis C tainted blood lawsuits, because the mass spraying will expose millions of people to the risk of health damage – not just residents of and travelers to Québec but also other Canadians as well as Americans.**

There are safe approaches that can be used to control and prevent West Nile Virus encephalitis. We will be most happy to offer our expertise, if requested.

We would appreciate your acknowledgement of this letter and your comments.

Sincerely,

(signatures on next page)

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There are a growing number of people who are sensitive or allergic to pesticides, suffer from asthma, Environmental Illness and other immune diseases, all of whom would suffer severely from pesticide spraying or fogging. Especially organophosphate pesticides (OP's) such as Malathion. Effects of the pesticides can be as debilitating as the virus, and last for many years, in some cases being permanent injury.  
<http://news.bbc.co.uk/1/hi/sci/tech/189982.stm>

There is no known cure for illness brought on from exposure to pesticides. No treatment or testing centers offered by government.

According to Health Canada, who has allowed Malathion for spraying/fogging over populations to control mosquitoes: Malathion is capable of **damaging the paint on automobiles** when used in a certain concentration. Who would protect us from human error and how do we protect our babies and children?  
[http://www.hc-sc.gc.ca/pmra-arla/english/pdf/fact/fs\\_malathion-e.pdf](http://www.hc-sc.gc.ca/pmra-arla/english/pdf/fact/fs_malathion-e.pdf)

Research at the Salk Institute has identified a gene that may link certain pesticides and chemical weaponry to a number of neurological disorders, including the elusive Gulf War syndrome and attention deficit/hyperactivity disorder (ADHD) (These pesticides are organophosphates such as Malathion)  
<http://www.sciencedaily.com/releases/2003/03/030318072141.htm>

Does an entire population need to be exposed to toxins to protect a few. More people can get ill due to immunosuppression caused by pesticides. How do they plan to protect pregnant women and children?

Can *all* mosquitoes that carry the virus really be wiped out. Pesticide use increases mosquito populations since natural predators are wiped out. Refer to 'Cicero swamp' study - (Near Syracuse, in New York State, they sprayed for 11 years, and the mosquito population is now up by **15 fold!!!**).

Has pollution been drastically reduced/eliminated since it causes death? - This has to be addressed rather than adding more toxins in the environment.  
<http://www.flora.org/afo/forum/1479>

Health Canada and its lack of testing centers, gaps in information, etc should be brought up, since it is believed that if Health Canada has allowed Malathion for mosquito control, all is well.

In the documentary it was reported that:

- **There was illness caused to all ages from WNV and not just the elderly (lowered immune systems) as previously believed. Immunosuppressed patients accounted for a small percentage of those who got ill from the WNV -**

Did all the people affected have immune system function tests, were they on drugs known to suppress the immune system.

- **Animals & birds dying**

Refer 'Our Stolen Future' - Theo Colborn - populations of animals dying from infections due to lowered immunity - possible cause: toxins.

The study on frogs can be brought up - pesticides including Malathion depressed the immune systems of frogs at levels as low as 1 part per million. "In human terms, impaired immune systems could lead to people dying of common colds or other infections that a healthy person would be able to resist easily...

... That was the whole take-home message, the pesticides act exactly the same way as a medical drug they will give to suppress your immune system."

-Immunologist Brian Dixon, University

of Waterloo

***Canada's Environment Commissioner has said smog kills more Canadians than car accidents, breast cancer, prostate cancer or melanoma.***

[http://www.davidsuzuki.org/Campaigns and Programs/Climate Change/News Release s/newsclimatechange09250201.asp](http://www.davidsuzuki.org/Campaigns_and_Programs/Climate_Change/News_Release/s/newsclimatechange09250201.asp)

## **Appendix "B"**

### **Improving Mosquito Management Least Toxic Solutions for Your Home, Garden, Pets and Community**

#### **About Mosquitoes**

Mosquitoes are a very successful species and are found in many different types of environments. Mosquitoes breed within a short period of time, live a fairly long life, migrate, survive during unfavorable conditions, and produce a large number of offspring. Males live only 1-2 weeks, but females may live up to 2 months. While both males and females feed on plant nectar to provide energy for flight, only the females take blood meals in order to provide protein for egg development. **Not all female mosquito species feed on blood, however, and not all mosquito species feed on people.**

**Mosquitoes are an important source of food for many predators: freshwater shrimps, ants, bats, birds, crabs, dragonflies, fish, frogs, toads, beetles, spiders, etc. Traditional chemical treatments often unnecessarily expose large areas, including the people and wildlife that live there, to toxic materials.** Using a less toxic method of control is significantly better than regularly wiping out an entire wildlife food chain.

All mosquitoes develop in water that is very slow moving or still, developing through four distinct stages: egg, larva, pupa, and adult. Larvae take 4- 10 days to complete their development, depending on the species, water temperature and other factors. **Of the 53 species found in Illinois, Michigan, Wisconsin and Indiana, only four are considered annoying to humans: Anopheles, Aedes, Culex, and Culiceta.**

## **Mosquito Control**

### **Concerns With Current Management Techniques**

**Mosquito control agencies in the U.S. and Canada spend in excess of \$80 million annually to "control" mosquitoes; additional money spent by the public easily exceeds this figure. Unfortunately, much of the money and effort is used ineffectively and only puts more toxic materials into the air that people and pets breathe. Furthermore, these efforts often result in new problems, such as outbreaks of shade and forest tree pests, when mosquito "control" kills the organisms that normally keep these pests under natural control.**

Although the use of insecticides to reduce adult mosquito populations can be an excellent emergency procedure where disease transmission problems exist, it is imperative that the spraying be followed with source reduction measures and the application of larvicides. **Safe and effective management requires more attention, time and effort than the traditional spray-and-hope approach. For example, when you eliminate mosquitoes from a marsh or creek, you affect an important component of the aquatic food chain. And where you use persistent and/or accumulating poisons to kill mosquitoes, you can end up indirectly killing not only fish but birds as well, as happens with DDT.**

**Some mosquito control substances have proven toxic and destructive to the environment. The use of pesticides causes concern about contamination of ground and surface water, as well as health hazards to people and the environment. After the use of pesticides, the immediate number of mosquitoes may drop, but later increase because the predators have also been poisoned, have starved from lack of prey, or have moved on to hunt somewhere else.**

## **Alternative Management Strategies**

In order to develop the best approach for mosquito control, you must learn where to look for mosquito breeding grounds. Good management means preventing problems by thinking ahead. **During mosquito season, it is wise to keep window screens in good repair, wear protective clothing, and consider using less toxic herbal insect repellents.**

### **1. Indirect Strategies**

One effective way of lowering mosquito populations is to **reduce places where mosquito larva can live**. **Elimination of standing water is the key** to preventing mosquitoes from breeding around the home. **Even small efforts to drain an old flowerpot can lower mosquito numbers.** Start a systematic **survey** of your premises for **standing water** in which mosquitoes might be developing. Believe it or not, chances are very good that the pests are being produced *within a few yards* of where you are being bitten. Bats eat thousands of mosquitoes every night; putting up a **bat house** will help attract these natural predators.

## **Common Mosquito Breeding Sites**

**Check the following types of locations for standing water:**

- Cisterns
- Old tires
- Ornamental ponds
- Leaky pipe joints
- Rain barrels
- Stumps and tree holes
- Utility meters
- Boats that have not yet been drained
- Birdbaths
- Over-irrigated lawns and fields
- Septic tanks and wells
- cans, jars and other containers
- street gutters, catch basins at road corners
- wading pools

- clogged roof gutters
- saucers under potted plants
- drain outlets from air conditioners
- watering cans, buckets, and troughs
- dripping outdoor faucets
- leaf-filled drains
- standing water in tire ruts
- wheelbarrows or tilt-up carts, etc.

If the water cannot be drained, or containers filled in, removed or turned upside down, the problem will need to be addressed through other means.

## **2. Direct Physical Controls**

You should **screen windows and doors, and porches where evening activities take place**. Inspect screens each season and mend small holes or tears with dabs of clear silicone caulk. Screens should fit their opening tightly; gaps can be bridged with a soft, removable caulk such as rope caulk; door gaps can be filled with weather-stripping. **Head nets** like those worn by beekeepers can prevent mosquito bites around the neck and face in heavily infested areas.

## **3. Direct Biological Controls**

**If the larvae can be found before they emerge as biting adults, the problem can be solved before it becomes serious.** Once immature mosquitoes develop into adults, it is often too late to use environmentally benign management methods. Try one of these ideas:

- Small back yard ponds can be stocked with **goldfish** or the **mosquito fish** (*Gambusia affinis*). Fish must be protected from cats and raccoons by an overhang around the edge of the pool or an escape area where they cannot be caught.

Gardens with native plant communities, shrubs, trees, flowers, and ponds that host predators (*such as birds, frogs, fish, etc*) can help to reduce mosquitoes, as well as provide beautiful, low maintenance landscapes.

### Summary

It is not realistic to assume that all mosquitoes can or should be eliminated from the area in which they are troublesome. The cost of environmental degradation in terms of wildlife loss would be too great, because mosquitoes are important prey for many birds, reptile, amphibian, fish and other food chains. It is important to establish long-term goals that enhance the checks and balances that occur in nature. The use of pesticides should be regarded as a last resort, a tool with limited short-term benefits and many potential long-term problems.

*All information presented above was adapted from; McHenry County Defenders Woodstock, IL . Their presentation was based on extraction from the following:*

- **Information Guide #1** (Revised), Spring, 1996, produced by the League of Women Voters Lake Michigan Inter-League Group, which studies environmental issues affecting the Lake Michigan basin and its surrounding states
- **Common-Sense Pest Control**, by William Olkowski, Sheila Daar, and Helga Olkowski, A fine Gardening Book, Taunton Press, Newton, CT, 1991